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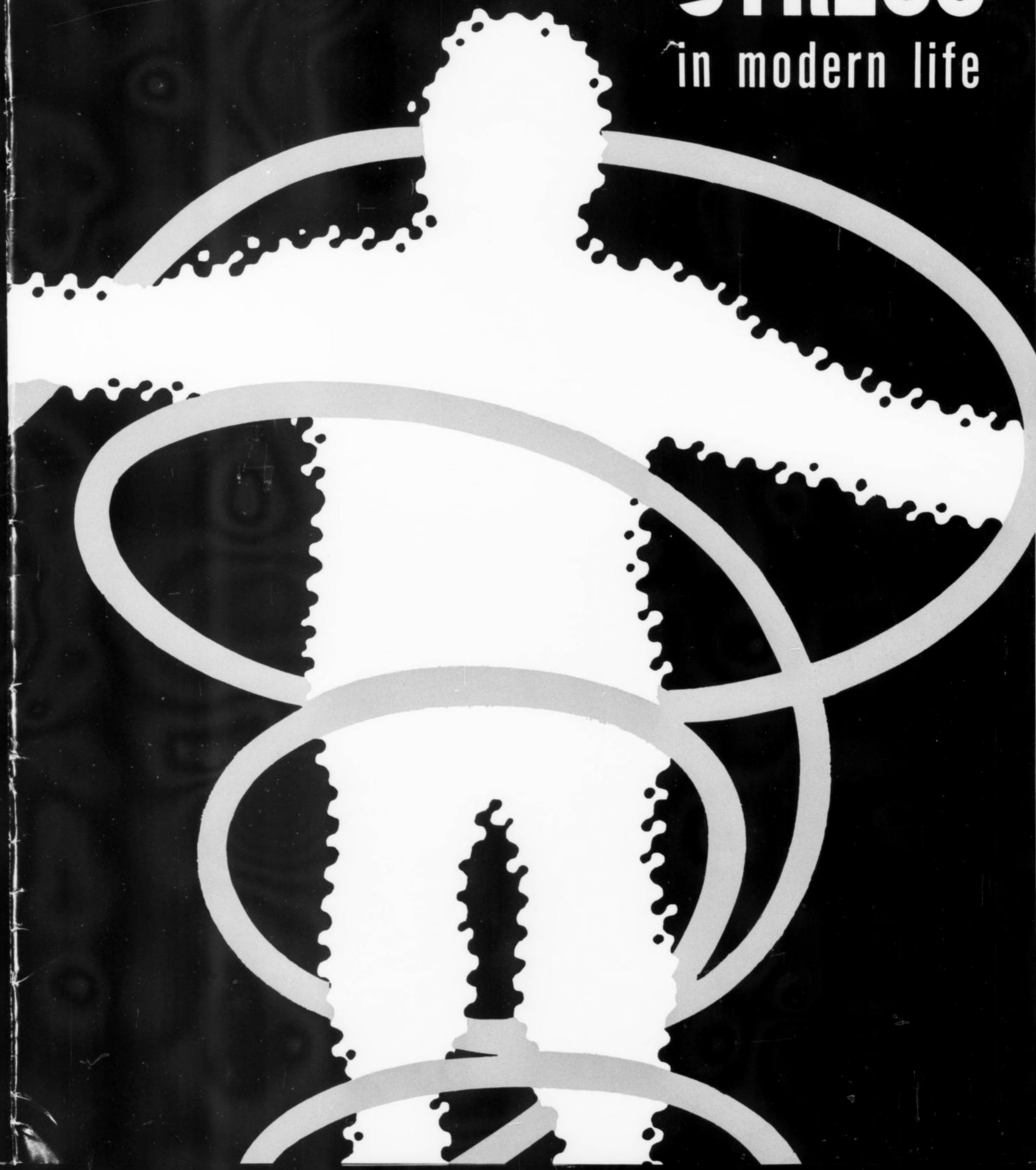
STRESS in modern life



International Women's Year

TREASURES OF WORLD ART

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JAPAN

Nipponese noblewoman

Heavy earrings, hair held by a comb and coiled in a chignon, a necklace of pearls and an elegant dress adorn this Japanese noblewoman whose tomb figure (detail below) was sculpted by a 5th century "haniwa" craftsman. Haniwa, reddish brown unglazed pottery, were originally simple cylinders used to fence off the cemetery mounds of ancient Japan, vestiges of which are still found in some parts of the country. Later, the tops of the cylinders were decorated with human figures, animals and objects. The tomb "portrait" of this Nipponese noblewoman is one of the relatively few haniwa that depict a full human figure. Unearthed at Yagi, north west of Tokyo, the figure is 90 cm high.

Photo © National Museum, Tokyo. From "La Civilisation Japonaise" by D. and V. Elisseeff. Editions Arthaud, Paris, 1974.

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The hectic pace of modern life subjects the human organism to incessant tensions and stress that overload and wear down its powers of resistance. What harmful effects are caused by stress? What are the limits of the body's ability to adapt to the growing pressures of everyday life ? Scientists are today studying the nature of stress to find the answers to these and many related questions (see article page 5).

Drawing © Roman Cieslewicz, CSCEI, CCI.

Photo Yves Dejardin © Rapho, Paris

Any sudden break in the rhythm of daily life produces stress, often thought of as a typical 20th-century ailment. "Sound pollution"—the noise of pneumatic drills, traffic, aircraft, etc.—is only one of many modern pressures which inflict strain on the organism, adding to the tensions which have always been an inescapable part of human life.

STRESS

by Ivan S. Khorol

The wear and tear of modern life

MODERN man is almost constantly under stress. A scientist solving a complicated mathematical problem, a businessman facing keen competition, a husband watching his wife dying of some incurable disease and a sportsman straining every muscle to the limit are all in their different ways undergoing stress. Stress has been defined as the response of the body to any demand made upon it, whether pleasant or unpleasant, that requires it to readjust to an entirely new situation.

As a result of millions of years of evolution, living organisms can function efficiently in their normal environment provided that their "internal environment" remains within the fairly narrow limits of what, for each organism, are ideal conditions. The norms involved differ from one type of organism to another—the temperature at which fish thrive, for instance, would be lethal for rabbits.

The ideal conditions of the internal environment needed by an organism if it is to function normally have been established by an age-long process of trial and error. They are recorded in the organism's gene memory and passed on from one generation to another. But since the world in which all creatures exist is constantly changing, nature has endowed them with special mechanisms which enable them to regulate and maintain their internal stability.

These self-adjusting systems operate on the feedback principle, and each has a different function. The one responsible for maintaining the body's equilibrium is known as homeostasis (from the Greek words *homoios*, meaning similar, and *stasis*, meaning position). As the American physiologist Walter Cannon has put it, homeostasis is "the co-ordinated physiological processes which maintain most of the steady states in the organism." Other systems (unconditioned and conditioned reflexes) help living beings to find the best possible external environment or to change it to suit themselves.

The general way in which these two closely connected mechanisms work is well known. Unconditioned reflexes come into operation first. When an abnormal situation arises, this mechanism sets off a series of reactions in the organism to restore things to normal. When an animal gets too close to a fire it recoils; when it finds there is not enough to eat in its usual feeding grounds, it looks for food elsewhere.

If unconditioned reflexes are unable to restore the situation to normal, another biological mechanism, known as homeostatic regulation, goes into action.

An organism deprived of enough food is prompted by its built-in control mechanisms to adopt a pattern of behaviour that uses up fewer calories. Its biological mechanisms also compensate for any excess in the substances needed to sustain life: when the blood-sugar level rises, the pancreas secretes an increased quantity of insulin, bringing the sugar level back to normal.

The purpose of these reactions by the organism is always to preserve its integrity and a certain degree of independence in relation to its external environment, and also to enable it to adjust to changes in that environment. Both these processes are called adaptation.

Hans Selye, a leading Canadian physiologist, who has studied the problems of biological adaptation and stress for many years, has affirmed that "Adaptability is probably the most distinctive characteristic of life." In this article I have drawn extensively on the results of Selye's research and some of the basic ideas of his stress concept.

The processes of adaptation such as I have described obviously operate in the human organism: when we are short of food, for instance, we do everything possible to procure some, and when we are cold, our blood vessels shrink so as to reduce heat loss from the body's surface. ▶

IVAN SEMYONOVICH KHOROL, *Soviet physician, has devoted many years' research to the problems of mental fatigue, and is the author of numerous books on scientific questions for specialist and general readers.*

With the emergence of human society, however, another adaptation mechanism evolved, which might be termed the system of social adaptation.

The growth of civilization led to the development of certain values and standards of social conduct, considered to be beneficial to the individual and society as a whole. Among these values are respect for kinship, the prohibition of incest, murder, etc.

These rules, which are transmitted from generation to generation, vary from one society, State or people to another, but the important thing is that every adult is aware of them.

When someone notes a divergence between what he has come to accept as normal and what is actually happening, he may be impelled by the mechanism of social adaptation to try to change the situation. He may do all he can to protect his family from danger, to prevent a murder or a theft, to attain a better place in society—always provided that these forms of behaviour are part of the rules he has learned from his parents and teachers.

But if in spite of all his efforts, he is unable to change the situation in the way he wishes (if, for instance, he fails in his career or loses a close relative) then he must make the best of it and adapt to things as they are. He must change his outlook on the world, and readjust his habits and his standards of conduct. In other words he must reduce or cancel out the difference between things as he would like them to be and the real-life situation.

Any discrepancy between the norms to which the organism's adaptation systems are attuned and the actual state of affairs within the organism or outside it produces stress. These stress-producing factors (or "stressors" as they are known) set off first an alarm signal and then a stress reaction. At this point biological mechanisms come into play to enable the organism to adapt to the demands being made on it.

One of Selye's most important achievements has been to show, on the basis of precise biological experiments, that the adaptive reactions of living organisms are powered by what he calls "adaptation energy", a kind of "fuel" stored within the organism.

In his book "Stress without Distress", he notes that the concept of stress is very old:

"It must have occurred even to prehistoric man that the loss of vigour and the feeling of exhaustion that overcame him after hard labour, prolonged exposure to cold or heat, loss of blood, agonizing fear, or any kind of disease had something in common."

According to Selye, adaptation energy is not merely caloric energy. For example, during illness, which can be considered a form of adaptation whereby the body endeavours either to eliminate an infection or to live with it, the patient may have a normal or even higher than normal intake of food, i.e. raw material for the production of caloric energy. Nevertheless, he continues to lose strength.

What can this new physiological theory of stress and adaptation energy tell us about the condition of modern man? What happens when the businessman, the scientist and the sportsman have to respond to demands for increased mental and physical effort?

According to Selye, the body responds in an absolutely stereotyped manner to the many different demands made on it. There is, for instance, increased activity of the cortex (outer shell) of the adrenal gland, which secretes hormones into the blood, and shrinkage of the thymus (an endocrine gland in the chest).

The body's reaction is always the same, differing only from one case to another, if the adaptation system is functioning normally, according to the intensity of the stress. The behaviour of the body can be compared with that of a crew of oarsmen trying to follow a course against an adverse wind: the more the wind and waves tend to drive the boat off course, the harder the oarsmen must row to reduce their effects.

This phenomenon seems at first sight to be something of a paradox. One can accept that the processes of adaptation controlled by the unconditioned reflexes (regulating, for instance, the functioning of the heart or the tone of the body's vascular and muscular systems, etc.) have a common basis and use some sort of catalytic "adaptation energy" in addition to caloric energy. Unfortunately, however, the carrier of this adaptation energy is still unknown.

But how is it that purely psychological stresses cause the same biochemical reactions in the body as those created by physical stresses such as cold, hunger or exhausting physical labour?

Everyone, as I have said, carries around in his memory a set of social standards. If we accept one of the most popular current theories of memory—that living organisms retain information by re-ordering the atoms of the protein molecules within the brain cells—we can also accept the argument that any stress reaction experienced by the organism will also have its effects at molecular level.

When it is impossible to eliminate stress by changing our environment, all we can do is to wipe out the "ideal" which is recorded in our memories, in other words, to re-arrange the atoms in the protein molecules of our brain cells. To do this we need to expend a certain amount of energy—adaptation energy.

Each of us receives at birth, written into our genetic make-up, a certain ration of adaptation "fuel", the size of which varies from one individual to another but only within fairly narrow limits. Nature has provided us with a special mechanism which strictly controls the rate at which this fuel is fed into the organism.

This mechanism can be compared to a coalmine. Batches of "fuel" are brought up regularly to the surface and distributed to the various homeostatic systems, enabling them to carry out minor "repairs" and to eliminate the stresses of everyday life. In this situation, the body functions like a motor engine working at cruising speed. Fuel consumption is low and there is enough "in the tank" for many years of normal human life.

This is the ideal, but in the hectic times in which we live, the reality is very different. Nowadays, our various adaptation systems are faced with cases of extreme stress which demand considerably more than their normal ration of adaptation fuel.

In such circumstances, the organism

"Get set... go!"

The athlete who leaps into action at the sound of the starter's pistol discharges the nervous and muscular tension that has built up in him before the race. To cope with "stress situations" of this kind, the organism mobilizes what has been called "adaptation energy", although no precise scientific method exists for measuring it. But scientists have noted that the organism reacts identically whatever the cause of the stress (competitive sport, pressures in professional, social or emotional life, or physical illness). Exhaustion of adaptation energy through demands that are prolonged, too frequent or too intensive leads to "distress", an unpleasant or damaging form of stress.

Photo Gerry Cranham © Rapho, Paris

sends out a distress signal and all available stocks of adaptation energy are directed towards the disaster area. This full-scale mobilization enables people to perform "superhuman" feats: someone who has never done any sport in his life manages to jump over a wide ditch when pursued by a mad dog, a scientist carried away by his own enthusiasm solves a problem which hitherto seemed insoluble.

Unfortunately, all these "emergency calls" leave their mark on the organism. While all the adaptation energy is being used in the main theatre of operations, the adaptation processes in other parts of the organism are slowed down through lack of fuel. The organism's normal functioning is disrupted and it wears out before its time. For example, mental fatigue can lead to nervous disorders of the myocardium (the muscular part of the heart), causing biochemical changes which in turn spark off disruptions in the control of the blood supply. "Distress" is simply an aggravation of this process, which causes the myocardium to age prematurely.

Doctors have reported cases where patients with extensive skin burns have developed stomach and duodenal ulcers. These ailments may well be connected with a shortage of the adaptation energy required for the normal operation of the homeostatic regulation system in the stomach and intestines, all the available energy having been mobilized to deal with the burns.

Both unpleasant stress ("distress", as Hans Selye calls it) and less intensive but prolonged stress are damaging. Distress causes a state of shock, with the organism, even with the help of all the available energy, unable to cope with the imbalance (as in the case of a man freezing to death). Prolonged stress causes premature and irreparable wear and tear on the organism, as well as functional disorders.

A person who has suffered a serious illness or a severe shock will eventually recover his or her vigour, but the "scars" left by the period of extreme stress will never disappear. Blood pressure, ulcers and diabetes are all in a sense indelible scars from wounds caused by distress.

Even more dangerous, however, are cases when an organism placed in an extremely critical situation forces the "mine" to work overtime.

This means that for a while it receives extra supplies of life-giving energy. But alas, there is no fooling nature: these inherited reserves are limited, and it is extremely dangerous to burn them up too fast. The first warning signs of this impending danger are already to be seen in the present widespread increase of what Selye calls "diseases of adaptation".

Hans Selye's stress concept gives a new insight into several alarming developments in the last two decades, such as the sharp rise in cardiovas- ▶

Photo Henri de Châtillon © Rapho, Paris

Stress without distress

"Contrary to widespread belief, stress is not simply nervous tension nor the result of damage", writes the Canadian scientist Hans Selye, internationally famous for his research into stress. "Anything, pleasant or unpleasant, that speeds up the intensity of life causes an increase in stress. A painful blow and a passionate kiss can be equally stressful. Stress is not necessarily something to be avoided. It is associated with the expression of all our innate drives. Indeed, complete freedom from stress is death!"

cular illnesses and cancer, drug addiction and suicide, violence and terrorism, and the outbreak of various mysterious epidemics.

Could these be due to a drastic reduction in human reserves of adaptation energy? Are these reserves being squandered as the result of disturbances in adaptive systems that are overloaded by the stresses of modern life?

It is generally agreed that the developed countries have been hardest hit by the ills mentioned above. This may seem surprising since progress in industry, science, agriculture and public health has brought favourable living conditions to these countries.

However, the apparent paradox is easily explained when one takes into account the chain reaction of mounting pressures in everyday life faced by people in these countries.

Men and women living in modern industrialized societies are subject to far greater stress than those living in the developing countries or our predecessors in the 19th century. As already noted, each stress reaction burns up a certain amount of "adaptation fuel" and in cases of "distress" all or nearly all of our "reserve stocks" are summoned up. As a result, the mechanisms of adaptation which control and regulate other vital systems in the body such as the cardio-vascular and digestive systems cannot function normally.

It is probably no coincidence that cancer has become so widespread since we entered the age of the greatest tension and anxiety and most rapid change that the world has ever known. Perhaps the growth of cancer cells is connected with disruptions of the human homeostatic mechanism.

A correlation can also be made between the abuse of alcohol and drugs and the exhaustion of adaptation energy: people who are chronically short of such energy naturally tend to turn to stimulants. But the use of these substitutes has much the same effect as that of a whip on a tired horse.

We have already pointed out that in order to live a normal life, everyone needs to be guided by certain standards. This ideal model of the world around comes from education and upbringing, and people try to conform to such a model from an early age. Faced with the reality of daily life each person is exposed to different forms of stress (and sometimes distress), to which, in practical terms, he or she can react in one of two ways.

The first way is to try to bring reality into line with his own standards. However, transforming society is easier said than done. The individual who persists in this course may either try to revolutionize and improve society or he may become a social misfit, a delinquent or criminal, and a danger to society.

The other alternative is to readjust his own standards, and this at first sight seems the easier course. Unfortunately, by choosing to conform, he has to retreat from one ideal and moral principle after another, and each of these readjustments uses up adaptation energy. Should he be unable to cope with this problem, he turns to drugs or alcohol in an effort to deaden his distress.

The chronic shortage of adaptation energy may have another even more dangerous consequence for modern man. In his writings on stress, Hans Selye links the loss of vigour, the apathy shown by people who have had a serious illness or been under severe nervous strain with the fact that their adaptation energy has been used up in the course of the stress reaction.

It is logical to suppose that "adaptation fuel" supplies energy for the "reflex of purpose" to which another great 20th century physiologist, Ivan Pavlov, accorded such an important rôle in human life. "The reflex of purpose is the basic form of the individual's vital energy," wrote Pavlov.

If this is so, another modern phenomenon can also be attributed to the over-consumption of adaptation energy: the decline, in relative terms, in the number of men and women of genius, those in whom the reflex of purpose is most strikingly demonstrated in the form of extraordinary intellectual power.

In some developed countries, there has been a marked increase in the number of suicides in recent years. Perhaps this too may result from a lack of adaptation energy and an overburdening of modern man's adaptation systems.

Unfortunately, technological progress, casting its spell over us, creates the illusion that the dangers are exaggerated or unjustified. The facts, however, leave no room for complacency. Specialists have reckoned that although the volume of scientific research is increasing, the number of researchers is mounting even more steeply. There has been a continuous decline in recent years in the amount of new scientific information obtained per scientist. Successful research results are increasingly being achieved by teamwork, not by outstanding scientists working individually.

Nor should we welcome the world population explosion. Statistics show conclusively that the population increase is due mainly to the decline in infant mortality and the rising birthrate in the developing countries.

But coronary thrombosis, strokes, cancer, mental disorders and suicide are taking a heavy toll in the industrially developed countries, especially among the most highly qualified, educated and talented—all those who are subject to the greatest stresses of modern life.

The fact is that, like a boat race crew, people today are using all their energy in order to go faster and faster. But sooner or later they must realize that although the boat is still moving forward under its own momentum, the crew is completely exhausted, having used up nearly all its adaptation energy.

I have simply wished to draw attention to this global problem, though without presuming to offer an overall solution. But it is clear that one must be found.

Research has hitherto been concentrated on the biological aspects of adaptation energy, but I would like to emphasize the importance of its social aspect, which has so far not been adequately studied.

In the final analysis it is society and the structure of society which determine the purposes for which men and women use their adaptation energy. And so society should not be indifferent to the ways in which this energy is used.

CONTINUED PAGE 32

MUSIC, DANCE AND ECSTASY

by Alain Daniélou

The sacred dance of the Turkish whirling dervishes (below): their movements as they whirl symbolize, among other things, the rotation of the planets around the sun. They dance with outstretched arms, right hands raised to the sky imploring divine grace, left hands turned downwards to transmit it to the earth. Right, illumination from a 16th-century Persian manuscript showing dervishes dancing to the sound of tambourines and a flute.

Photo © Paul Mauguin, Paris

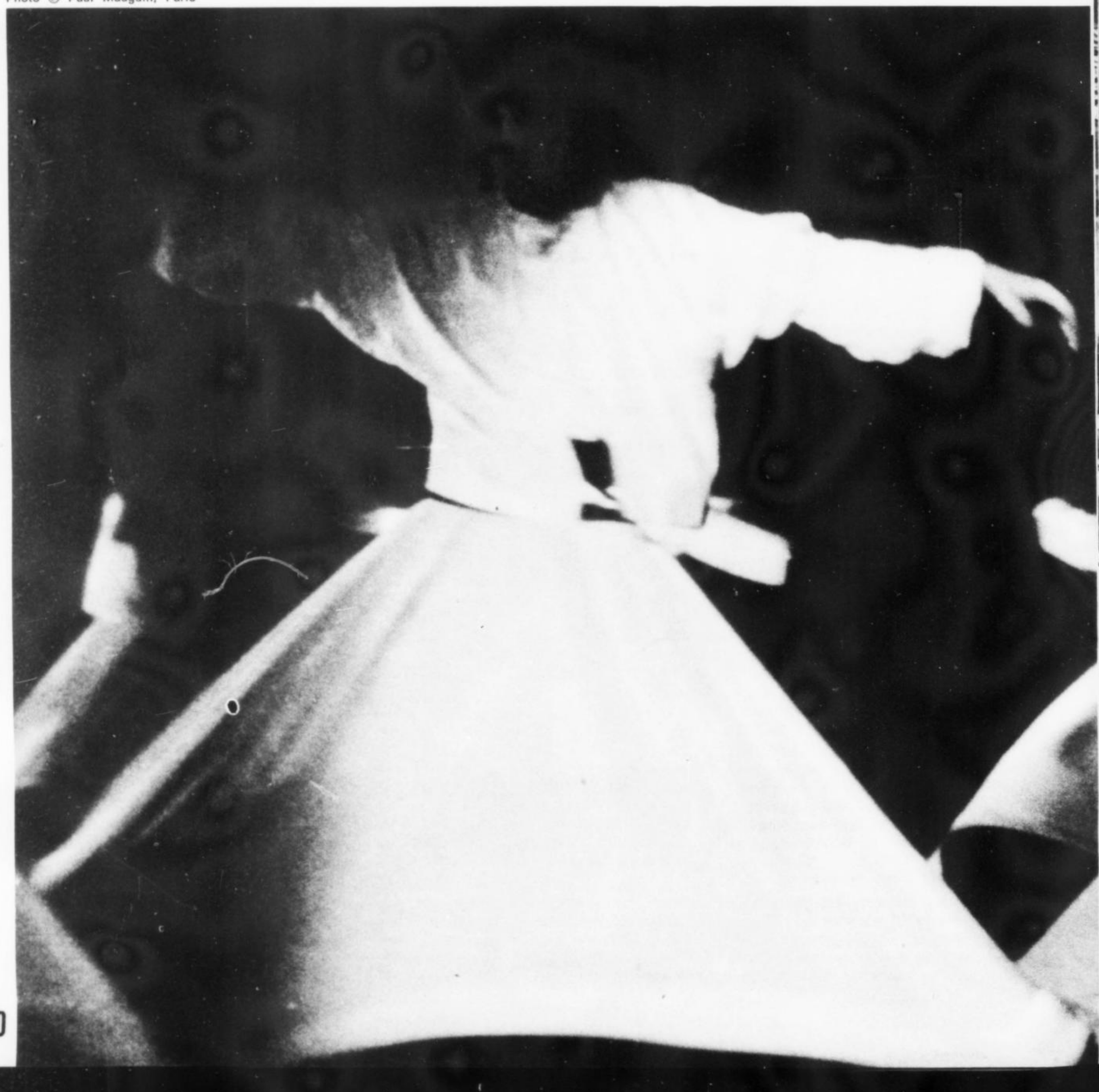

Photo © Bibliothèque Nationale, Persian Section, Paris

Unesco-sponsored studies of different cultures sometimes reveal the common origins of the great currents of civilization from which the modern world has evolved. Traditional music is a striking example, particularly religious and ritual music which have preserved a remarkable continuity throughout religious, social and cultural changes.

Several recordings of religious and mystical music were recently issued in three Unesco collections of recorded traditional music—Musical Sources, Anthologies, and Musical Atlas—produced by the International Institute for Comparative Music Studies (in Berlin and Venice) under its director Alain Daniélou. These recordings are of outstanding interest since they add a new and living dimension to the studies of archaeologists and linguists. (See "Unesco Records", page 15). In the following article, Alain Daniélou examines the origins, evolution and significance of some of the ancient religious and ritual music that has come down to us from the past.

CONTINUED NEXT PAGE

ECSTATIC music and dances date back to the earliest days of mankind. Their aim is to create states of mind and body in which men and women, oblivious to material preoccupations, try to enter into contact with supernatural forces and to discern realities beyond the threshold of normal perception.

Such music and dancing are performed not only by so-called "primitive" forest peoples but also by those of the most developed cultures. For the latter they offer a way of breaking out of the rigid straitjacket imposed by social institutions, a possibility of affirming the importance of the individual. A person who considers he is being sacrificed to the overriding demands of the group feels "rehabilitated" and uplifted through personal contact with the mysterious world of the spirits.

This use of sound to produce psychological and magical effects would appear to be one of the fundamental rôles of music, perhaps even its original function, though we tend to forget this when considering the aesthetic aspects of the art of music.

Yet this, indeed, is an essential function of music and one that keeps recurring. But we can only recognize its characteristics if we are familiar with the rhythmic, melodic and modal techniques used and their corresponding dance movements.

In the ensemble of cultures spanning Asia from India to the Mediterranean the performance of certain forms of ecstatic dances and music as a means of communicating with the supernatural world appears to have its origins in a very ancient religion.

According to the Hindus, the God Shiva created the world and all living creatures through the harmony of his dancing and the rhythms of his drum. The legends of Shiva are told in a body of texts, varying greatly as to date and origin, somewhat similar to those of the Bible. These texts, known as the *Purânâs* ("ancient tales"), deal with a wide variety of subjects.

The oldest sections of the *Purânâs* were written at a very early date, though they were only translated from some now-forgotten tongue into Sanskrit at a much later period. According

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Photo from "Sacred Dance", by M.-G. Wosien, Thames and Hudson, London, 1974

This miniature from a 15th-century Turkish manuscript depicts a dancing shaman of Central Asia. Medicine-priests, shamans mediated between the spirit world and the members of their community. Through dancing they sought to enter into contact with the world beyond and obtain the power to prophesy and heal sickness.

to the chronology of the *Purânâs*, around the 6th millenium B.C. an incarnation of Shiva with the help of his wife, the mother-goddess Pârvati, taught men the practice of Yoga and how to use music and dance so that they could communicate with the gods.

Rites somewhat similar to these seem to have played a major rôle throughout the Indo-Mediterranean world. An obvious kinship exists between the ancient religion of Crete, the Egyptian cult of Osiris and the worship of Dionysus or Bacchus in Greece and Rome. Descriptions of bacchanals, dithyrambs [songs honouring Dionysus] and the ecstatic dances of the maenads [female attendants] that have come down to us correspond exactly with dance forms still current in India today.

The Nordic peoples who invaded India, Iran, Greece, and a large part of Europe from the 2nd Millenium B.C. onwards—and who, in India, called themselves *Aryans*, a word meaning "noble"—tried to stamp out these ecstatic rites. But the people still clung to them as their religion, and they reappeared when the repression abated. At about the same time, in the 5th century B.C., ecstatic dances and rites once more became an accepted part of official religion in both Greece and India.

No doubt existed in the ancient world that the Indian god Shiva and Dionysus, the Greek god, were one and the same. When Alexander the Great's soldiers reached India they immediately went to the Hill of Nysa, the sacred hill of Shiva, to embrace their brothers in Dionysus, the *Bacchoï* (followers of Bacchus) who in India were known as the *bhaktas* (participants).

There was a great revival of Dionysiac rites in the troubled period that saw the birth of Christianity, and these rites strongly influenced both Orphic ceremonies (inspired by Orpheus) and Christian rituals. Until quite recently, groups performing ecstatic dance rituals were still to be found in the Slavonic countries, in the Rhine region and southern Italy.

Group dancing leading to ecstatic states is still performed in India, in the form of *Kirtana* (the Song of Glory), which is similar to the Greek dithyramb. I have watched these ceremonies in southern India. The participants, standing in a circle and chanting repeated invocations, dance by swaying their bodies and shaking their heads in time with the deafening beat of drums.

When the movements have become automatic and almost unconscious, the rhythm speeds up, and then suddenly changes. This creates a shock, a disturbance which throws the dancers into a trance. Some of them, usually the women, are then possessed by a spirit: they tear their clothes, roll about on the ground, uttering prophecies. In ▶

Photo © Paul Popper, London

During their courting dance, cranes march in a circle, beating their wings and feet to the rhythm of their cries. Right, young Watusi women of the Zaire Republic execute the "dance of the crowned cranes". Observation of nature has inspired traditional dances in many human communities.

Photo © Mansell Collection, London

other words, the spirit speaks through their mouths.

The rhythms used are always uneven, in 5, 7 or 11 time. Even rhythms, those with 4 or 8 beats, do not produce this hypnotic effect. The process involved and the characteristics of these dances are the same the world over, in India, in the Middle East and in Africa, for example.

Buddhism, which originally began as a movement of moral, puritanical reform known as the *Hinâyâna* (the Lesser Vehicle), soon reabsorbed in its popular forms the Tantric rites of Shiva worship, including ecstatic rites, dances and erotic symbols.

It was in this more popular form, the *Mahâyâna* (the Great Vehicle) that Buddhism spread to Tibet and influenced the entire Far East. But while the *shomyo* [classical chant of Buddhism in Japan] contains many ritual gestures and practices carried over from the cult of Shiva, the ecstatic element is completely absent.

This is not the case in the Middle East. The Zikr or Dhekr rituals, which are performed by Islamic brotherhoods such as the Sufis, are directly descended from the Dionysiac ceremonies of Greece, whose musical techniques they have preserved along with gestures that are practically identical to those of India. These wonderful ceremonies give expression to one of the mystical aspects both of Islam and Hinduism.

Gatherings where the Zikr is performed are kept secret since they demand total concentration on the part of the participants, who must give themselves over entirely to inspiration. One comes across Zikrs in all the Shiite and Sunnite Muslim countries, in Syria, Lebanon, Egypt, Iran, Turkey, Algeria and Morocco. They are also performed in Yugoslavia, where the style of the songs has remained very close to their ancient Greek prototypes.

We were able to make recordings of and issue as records several Zikrs with the permission of the spiritual leaders of these brotherhoods. While these leaders are reluctant to allow the presence of outsiders to disturb the ceremonies, they nevertheless allowed us to make recordings of them for the benefit of those who are interested in these profound expressions of spiritual and mystical experience.

Only those who are permitted to take part in the rites of a brotherhood can learn the dance movements, the head-shaking and the swaying of the body that produce a state of ecstasy. Yet even in recorded form, the music and the singing create a

Photo © Australian Information Service, London

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1. This clay statuette of a dancing figure, its stomach covered with a mask was discovered in the Campeche region of Mexico and dates from the 7th-10th centuries.

2. Caught in mid-step, her dress swirling about her, a girl dances with her partner at the feast of Apollo, the Greek sun-god. Scene is a detail from a 4th century B.C. vase-portrait executed in southern Italy.

3. Jumping for joy. Today, as always, dancing brings release from the cares and burdens of everyday life.

Photo © *l'Univers des formes*, la Photothèque, Ed. Gallimard, Paris

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deep impression on the listener, helping him to discover a new dimension in the world of sound.

The Sufis, men inspired by a search for spirituality, join together in brotherhoods, rejecting the comforts of city life and practising a monastic austerity. Bernard Mauguin, a French musicologist, has written of them: "A great many such groups were formed around spiritual leaders known as Sheikhs, in the 11th century. These groups freely accepted a common discipline and devotion to a ritual which offered them a means of attaining the supreme goal of their existence: a perpetual quest for perfection leading to total dissolution of self in God (fanâ). Thus were formed the great religious brotherhoods of the dervishes (tarikat)... The Zikr is a formula for inward concentration and for achieving deeper knowledge of self... based on repetition of the names of God."

The name itself cannot in this context be considered separately from the rhythm of its repetition, for this alone enables the dancers to assimilate it into their own vital rhythms and to identify themselves with it. This can even be achieved through repeated listening to a recording of the Zikr. The aims and methods of the Zikr are almost identical to those of certain Tantric Yoga practices.

One can readily sense in the instinctive impulses of modern youth a yearning for a return to forms of religious experience not limited to the outward observance of social and moral rules, but concerned with the search for contact with the supernatural.

The rhythms of dance insulate man from his material and everyday preoccupations. It is through dance and rhythm that people seeking to enter into direct contact with the mysterious spirit world attempt to ward off evil influences and to create a kind of safety zone about themselves. This process plays a fundamental role in both African cults and Hindu rites. Dancing to music with a strong rhythm, such as Rock, can also become a kind of refuge, the expression—ill-directed perhaps, and at times despairing—of a deep-seated need, that can only find fulfilment in a return to initiatory rites.

Through their music and dance, these rites enable the entire being to partake of an experience in which divine love finds expression through the words of human love itself, as in the mystical poems of the great Sufi poets, such as the celebrated Persian classic, the *Mathnavi*, from the pen of Jalâl al-Din Rûmi.

■ ***Alain Daniélou***

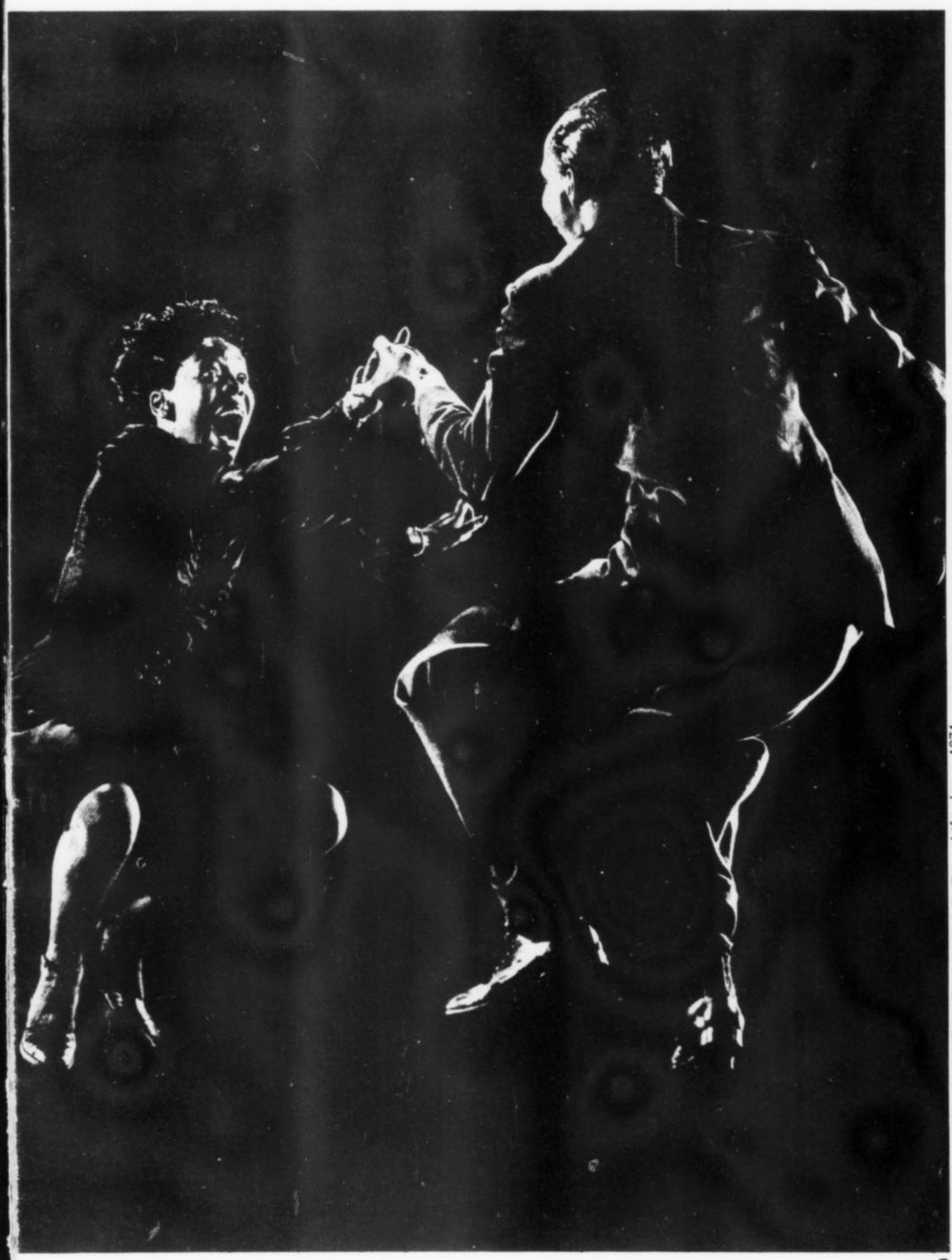

Photo © Gjon Mili, from "The Best of Life", Time-Life Inc., 1974

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DOOMSDAY FOR THE WORLD'S TROPICAL RAIN FORESTS ?

Today, faced with the pressing needs of a soaring human population, governments are seeking new frontiers for development, and tropical rain forests are coming increasingly under the threat of uncontrolled human interference.
Aware of the urgent need for further research on tropical forests Unesco was responsible for establishing, in 1958, the first international research programme in this field, the programme of Humid Tropics Research. This programme helped to alert world opinion to the fragility of the tropical forest ecosystem.
Today, under its Man and the Biosphere Programme, Unesco is leading and co-ordinating a vast international research effort aimed at reconciling the twin imperatives of conservation and development.
The first steps in the conservation programme have already been taken under the Man and the Biosphere project for "biosphere reserves" or protected natural areas ; already in Latin America, for example, Mexico is establishing biosphere reserves in its tropical lowlands, while Brazil has earmarked large areas of Amazonian forest in which reserves will be established.
In south-east Asia a typical pilot project on the development of swamp forest is now starting in the Upang Delta in Indonesia. Scientists are studying the possible impact of the large scale conversion of swamp forest into agricultural land on the environment in general, on the nutrient cycling of soil, on flood control, public health, on the social implications of human resettlement, etc.
In Africa, research workers are examining the possible effects of the development of the hitherto untouched Tai forest of the western region of the Ivory Coast.
In addition, a detailed state-of-knowledge report on tropical forest ecosystems, now in preparation, will be published by Unesco with financial aid from the U.N. Environment Programme and in co-operation with other U.N. Specialized Agencies and several non-governmental organizations.

Apart from the forests of the Amazon basin (right above) few undisturbed natural tropical rain forests exist today. Most are subjected to disturbances ranging from shifting cultivation by forest communities to exploitation of large areas for their valuable timber. Right, five tropical forest "profiles" showing effects of different degrees of exploitation. They are taken from a Unesco report on the increasing impact of human activities on tropical forests.

1. In this unmanaged forest, gaps between tallest trees are due to natural factors such as lightning, land-slides and hurricanes etc. (at left) to selective exploitation followed by natural regeneration (centre) and to shifting cultivation (right).

2. Several management techniques, used in conjunction with exploitation, assist natural regeneration. New trees grow between surviving tall ones from original forest.

3. Forest management has used several methods of artificial regeneration, including the planting of saplings in exploited areas and cultivation of tree crops alongside farming crops.

4. Intensive management has replaced original trees with conifers or hardwood timber plantations and trees for crops such as cocoa, palm oil or rubber.

5. Original forest has gone ; land is used for settled farming, including crop growing and livestock raising.

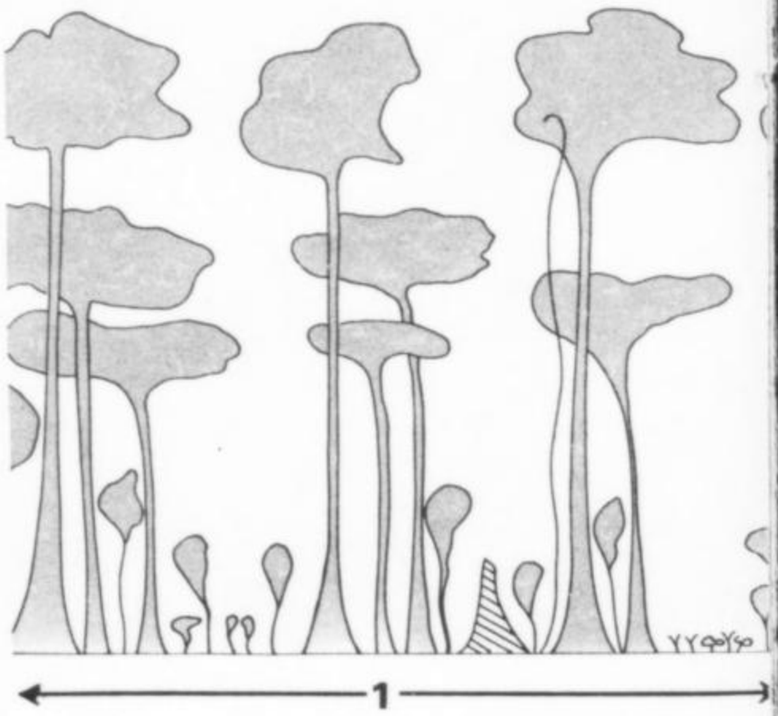

Photo E. Aubert de la Rüe © Rapho, Paris

Unless present trends are reversed virtually all the world's rain forests will disappear within 20 years

by Paul W. Richards

NOT many years ago the term "Tropical Rain forest" would have meant little except to a few specialists in tropical biology or in certain sections of the timber industry. Today the position is quite different: scientific and popular books and journals are full of references to the forests of the tropics—to schemes for their more intensive exploitation, concern at the rate at which they are decreasing and warnings of the possible consequences of their disappearance not only for the world's fauna and flora but for the earth's atmosphere and climate, and the whole human environment.

The mounting concern for the future of tropical forests is now

CONTINUED PAGE 20

PAUL W. RICHARDS *is Professor of Botany at the University College of North Wales, in Bangor, U.K., and was for some years chairman of the British Nature Conservancy's Committee for Wales. He has worked in many tropical countries, including Sarawak and Borneo, and is the author of "The Tropical Rain Forest", an outstanding general work on the subject. He was a consultant on tropical forest ecosystems for Unesco's Man and the Biosphere programme.*

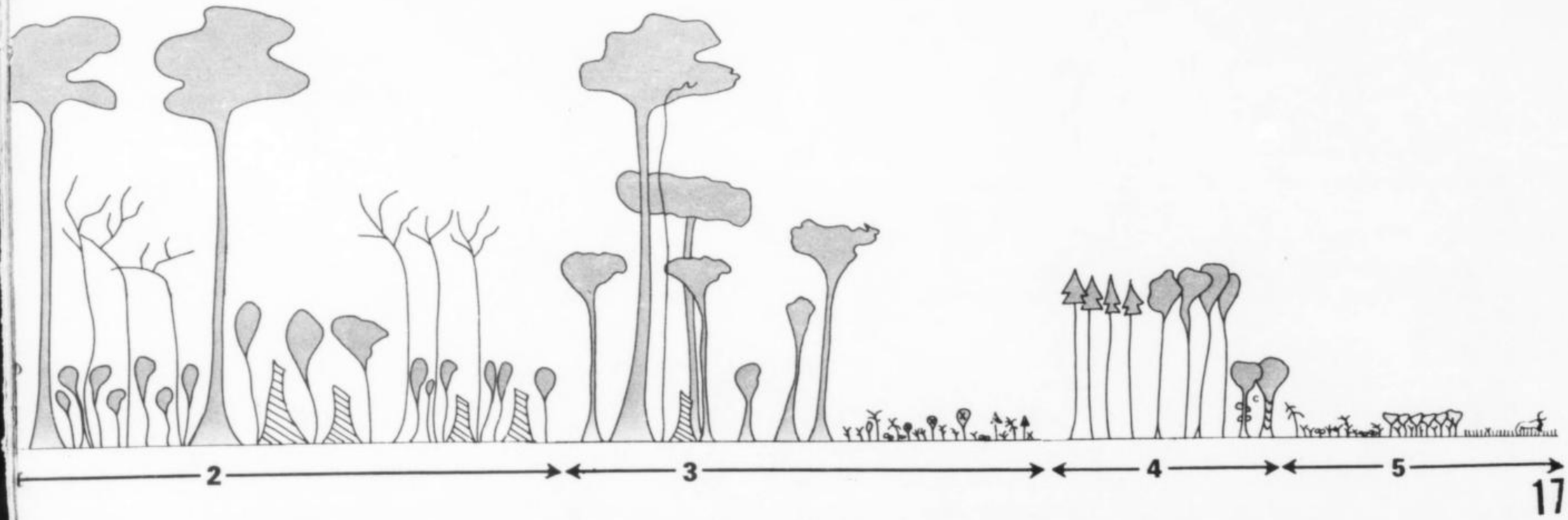

Photo Bruno Barbey © Magnum, Paris

Photo Yves Billon © Atlas Photo

The ominous sound of bulldozers and power-saws

The peoples living in the world's tropical rain forests have learned cull from their environment most of their basic needs. Left, an Amazonian Indian boy steers his canoe between huge leaves of *Vic amazonica* water lilies. Right, an African youngster crosses an Ivory Coast river spanned by an ingeniously-woven bridge of liana Today the forests increasingly resound with the roar of bulldozers the screech of power-saws. Above, a surveyor sets up his theodol a mangled and chewed section of forest marking the advance of B Trans-Amazonian Highway. During the construction of the highw running 5,400 km from north-east Brazil to the Peruvian frontier, 130,000 sq. km. of forest (an area four times the size of Belgium) cut down and burned. Below, winching out a fallen giant from a logging site in a Congo forest.

Photo, Paris

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reflected, as it certainly should be, in the agenda of the United Nations' agencies. Several of them are now sponsoring programmes intended to improve our still regrettably deficient knowledge of tropical ecology.

They are also aiming to promote the more efficient utilization of tropical forests and above all to encourage their conservation both as a renewable resource for the peoples of the tropical countries and as natural monuments which should be preserved for the admiration and study of future generations.

Tropical forests are an important part of the human heritage which should be the responsibility of all nations and not solely of the 20 to 30 in whose territory they happen to lie. To explain why this is so one must first say something about the biological characteristics of rain forest ecosystems and their significance to man.

Not all tropical forests are tropical rain forests.

In the lowland tropics, as in other parts of the world, the natural vegetation depends on the climate: tropical rain forests—tall, dense forests in which most of the trees are evergreen —are found only in regions where rainfall is abundant throughout the year, often falling on the average on three days out of every five.

Annual totals are high, often over 300 cm. But not all tropical forests are continually wet: in regions where four or more consecutive months are nearly rainless there are large areas of what are sometimes termed "seasonal tropical forests"; in these forests many of the trees lose their leaves for shorter or longer periods in the dry season. In the mountains of the tropics the type of forest changes with increasing elevation but usually up to about 1,000 metres it remains more or less similar to the lowland forests.

A survey carried out by the Royal Swedish College of Forestry estimates the total area of tropical forests in the early 1970s at 1,456 million hectares (equivalent to about half the world's remaining forests) of which about 560 million are different types of tropical rain forests.

The largest area of tropical rain forest still remaining is in Amazonia and the adjoining territories of South America but there are also considerable, though fast diminishing, areas in West and Central Africa, in the island of New Guinea, in Borneo and elsewhere.

Unique diversity of plant and animal life. The biological characteristic which above all others distinguishes tropical rain forests (and to a smaller extent seasonal tropical forests) from other natural ecosystems is the enormous diversity of species of plants and animals. While in temperate forests, whether broad-leaved or coniferous, an area of a few hectares seldom carries more than a dozen different species of trees, in tropical rain forests it is not unusual to find over 100 different kinds of trees of 30 cm. girth or more in an equivalent area.

In the rain forest of the Jengka Triangle in Malaysia (since destroyed) 375 tree species 91 cm. in girth and over were found in plots covering just over 23 hectares.

For animals the contrast between the tropical rain forest and other natural ecosystems is equally remarkable. An area of forest in Panama has about twice as many mammal species as a similar one in eastern U.S.A.

Elsewhere in Central America the number of resident bird species can reach five or six hundred in an area of 700 sq. km and even the tiny biological reserve of Finca La Selva in Costa Rica, only 6 sq. km in extent, has 221 species. Both these totals are much greater than are found in the same area of forest in the temperate zone. In tropical forests insects exceed all other animals put together in both number of species and total numbers.

Why tropical forests, especially rain forests, are so rich in different kinds of plants and animals is not entirely clear; several factors may be responsible. One is almost certainly age. Fossil evidence suggests that forests not very different from those of today already existed in the Malayan region and elsewhere in the tropics far back in geological time, perhaps as long ago as 70 million years.

Another factor may be climate: because the tropical rain forest is never subject to frost or severe drought plants and animals can grow and reproduce all through the year. Though recent research shows evidence of quite large variations in temperature and rainfall in the past, climatic changes as catastrophic as the Ice Ages which devastated Europe and North America in the Pleistocene period seem never to have occurred near the equator.

The tropical rain forest has thus been a sort of evolutionary laboratory in which biological changes have been proceeding uninterrupted by major climatic disasters over an enormously long time.

New drugs and pesticides from tropical forest plants. For modern man this great reservoir of species represents a potentially valuable pool of genetic diversity of which only a small fraction has been utilized so far. Economists, land planners and politicians in tropical countries frequently regard tropical forests merely as a reserve of valuable timber to be exploited as quickly as possible either to supply local needs or to be exported to provide much needed capital for development.

This point of view is understandable but unbelievably short-sighted. Our knowledge of tropical plants and animals is still so inadequate that at present their uses are known only to a very small minority. Even of trees reaching timber size only a small proportion of the species are used for any purpose (except when the entire forest is used to provide wood pulp for papermaking). Yet among the thousands of species of trees, vines and other plants in the tropics there may be many producing chemical compounds potentially valuable as drugs or in other ways.

Flying lizards and 'see through' butterflies

1. The world's rain forests abound with singular creatures, many of which have developed special abilities for swinging, jumping or gliding from tree to tree. Here, the Draco or flying lizard in a Borneo forest uses its wing-like membranes to glide as much as 15 metres between trees.

2. This extraordinary butterfly from Peruvian Amazonia has transparent "panels" in its wings through which the veins of the leaf behind are clearly visible. South America has more species of butterflies than any other continent and thousands more species have still to be identified.

3. The fluffy tarsier from the Philippines has huge goggle eyes which, in relation to its 15 cm. body, are 150 times bigger than a man's. A nimble forest acrobat capable of spectacular leaps, the tarsier can swivel its head through 180 degrees.

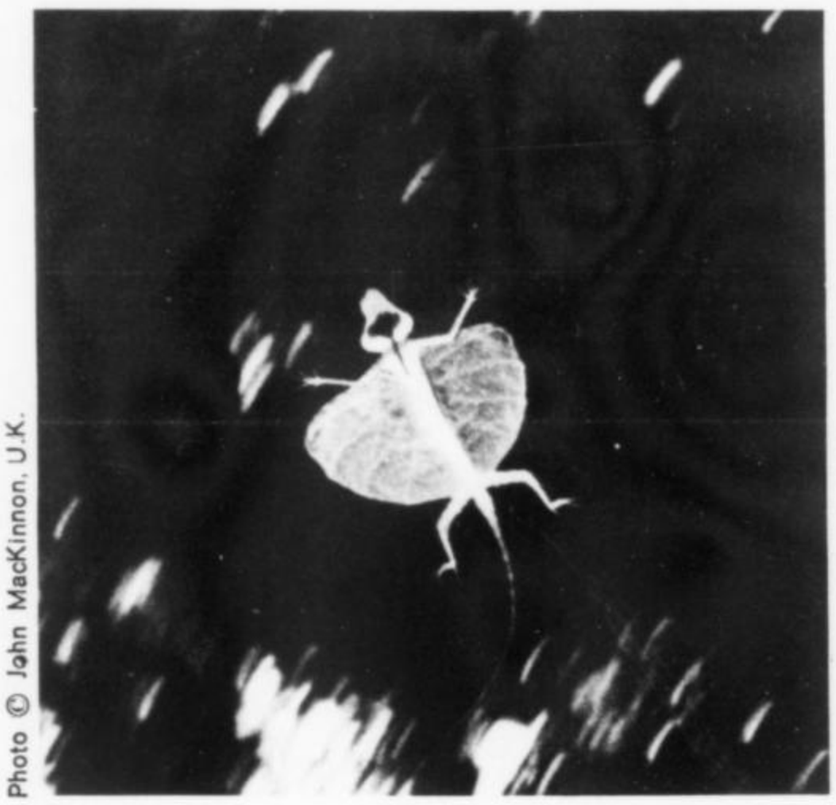

Photo © John MacKinnon, U.K.

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Photo C. Lenars, © Atlas Photo, Paris

A wild dioscorea growing in the forest provides the steroids used in manufacturing contraceptive pills and is in fact one of Mexico's most valuable exports. L-dopa, a drug used in controlling Parkinson's disease, has recently been found in the seeds of tropical vines of the genus *Mucuna*. These are only two examples: how many other chemical treasures lie hidden in tropical forest plants can only be guessed.

With tropical forest animals the position is much the same as for plants. A few such as apes and monkeys, some butterflies, parrots and birds of paradise have a commercial value and are in fact in urgent need of protection, but so little is known about the vast majority that their possible significance to man is still totally unrealized.

Perfectly balanced forest ecosystems. Another biological characteristic of tropical rain forests which makes their survival of special importance to man can be summed up in the phrase "a stable self-maintaining ecosystem". In fact many of the world's other natural ecosystems such as tundras, steppes and coniferous and broad-leaved temperate forests are stable and self-maintaining; in the absence of large-scale disturbance by man or major climatic changes they would continue to exist much as they are now for thousands or millions of years.

In the case of the tropical rain forest its huge assemblages of plants and animal species have existed together for so long that an extraordinarily complex system of adaptations between the organisms and between them and their environment has developed. As a result diseases and pests never seem to reach epidemic proportions because there are so many inbuilt checks and balances.

Drooping fronds of vegetation almost completely hide the tree trunks in this forest on one of the 500 islands of Fiji in the South Pacific.

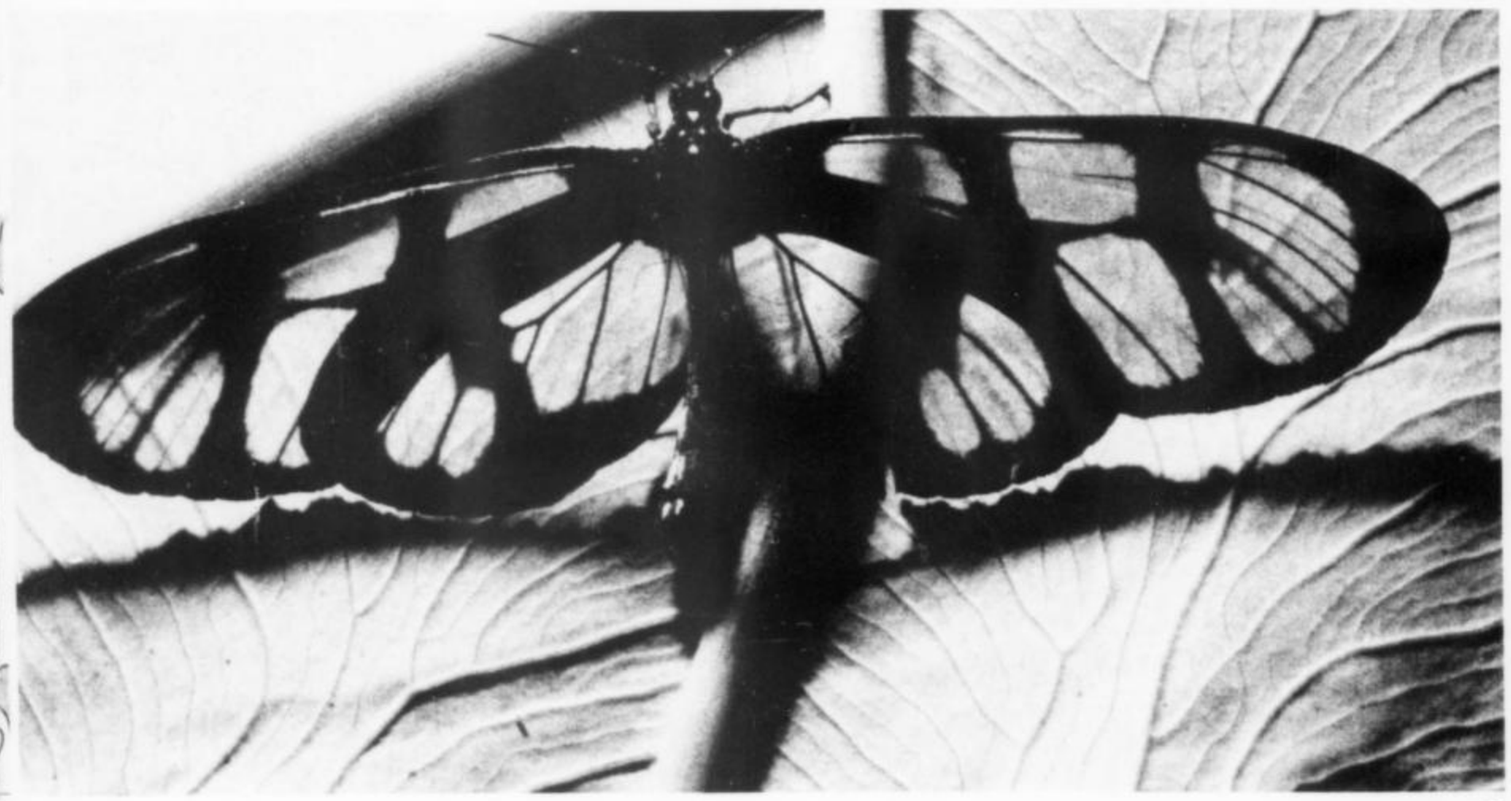

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Photo Tom McHugh © Pitch, Paris

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On the other hand, in artificial ecosystems created by man such as gardens, wheatfields and rubber plantations, damage from pests is a continual threat and can be controlled only by unrelenting warfare with herbicides, fungicides and pesticides.

Improved methods of managing artificial ecosystems can undoubtedly be devised by studying the controls which exist in natural ones; this has already been done in some instances, for example in controlling the insect pests of cocoa, and of mahogany, teak and some other tropical trees. We need to preserve what is still left of the natural tropical forests because there are certainly many more such lessons we could learn from them.

Yet another field in which we may be able to learn from the delicately balanced rain forest ecosystems is that of plant nutrition. The soils on which tropical forests grow are for the most part remarkably poor in nitrogen, phosphorus and other elements necessary for plant growth, a fact which is concealed by the luxuriant appearance of the vegetation.

The poverty of the soils is partly due to the long-continued effects of heavy rainfall and partly to the geological history. The explanation of the paradoxical vigour of the vegetation is that a large part of the nutrient capital of the ecosystem is contained in the trees themselves and is rapidly recycled. When the leaves and dead wood fall to the ground fungi and other decomposer organisms quickly break them down and the nutrients released in this way are very quickly absorbed by roots and re-used.

In tropical forests this recycling process seems to be extremely efficient and so little nutrient is lost in the drainage water that the streams flowing from undisturbed forest areas, such as parts of Amazonia, carry water little different in composition from pure rain water.

Scientists working in Amazonian forests, where the soil is often unusually poor in nutrients even compared with other tropical rain forests, point out that the whole structure of the forest is a finely adjusted mechanism for trapping, conserving and recycling the very small quantities of nutrient elements available to it in the rainfall and soil.

Clearly in these days when rising costs and diminishing supplies of agricultural fertilisers are restricting the growth of world food supplies, we need to learn all we can from the economical housekeeping of natural systems such as the tropical rain forest.

The collecting and conserving of nutrient elements by tropical rain forests is only one of the ways in which they affect the environment. Others, certainly of great significance, include the effects which forests, in common with all other vegetation, have on the carbon dioxide and oxygen content of the atmosphere, and their effects on rainfall, evaporation and the hydrological cycle generally. On all these environmental effects there is a regrettable lack of quantitative data so that their importance, great though it probably is, can be indicated only in very general terms.

How long can the tropical rain forest survive? If the rain forest is a stable self-maintaining ecosystem which has survived the hazards of millions of years, why is it now decreasing in area so rapidly that its survival for more than a few more decades is in doubt?

Clearly the answer is that it cannot survive the attacks of modern man equipped with the resources of advanced technology. Through its long evolutionary history natural selection has provided the forest ecosystem with mechanisms for withstanding such natural hazards as invasions of new species, the evolution of new parasites and pests, minor climatic fluctuations and so on—but selection has not provided it with means to resist large-scale attacks by powersaws, bulldozers and herbicides.

To man at lower cultural levels the forest has been fairly resistant: primitive hunters and gatherers (a few of whose descendants still live in the forest today) made little impression on it and even agricultural peoples living by shifting cultivation did not damage it irretrievably so long as their numbers were limited. It is the population explosion of the last hundred years and the extension of advanced technology to the peoples of the humid tropics which has made its survival questionable.

At the present time the threats to the tropical rain forest come from many directions. The world demand for timber is rapidly growing in both the developed and the developing countries and as the forest resources of temperate Eurasia become used up, the pressure on the forests of the tropics increases. As a result lumber companies financed from distant industrial countries are clear-felling enormous areas of rain forest in Indonesia and elsewhere.

Tropical forests are now being used, not as hitherto, mainly to supply high-grade hardwood timber for construction, furniture-making and veneers but also to provide cellulose for paper making. Already whole tracts of forest are being felled to feed mills where trees of all species are converted indiscriminately into wood-chips which are exported overseas to be converted into paper: such installations are already in operation in Colombia and New Guinea and others are being planned elsewhere.

The inexorably rising demand for newsprint is also leading in some countries to large areas of forest being cleared to make way for plantations of fast-growing trees such as pines and eucalypts which can produce paper making material faster than the native forest trees, though whether their high rate of production can be maintained through many successive rotations remains in doubt.

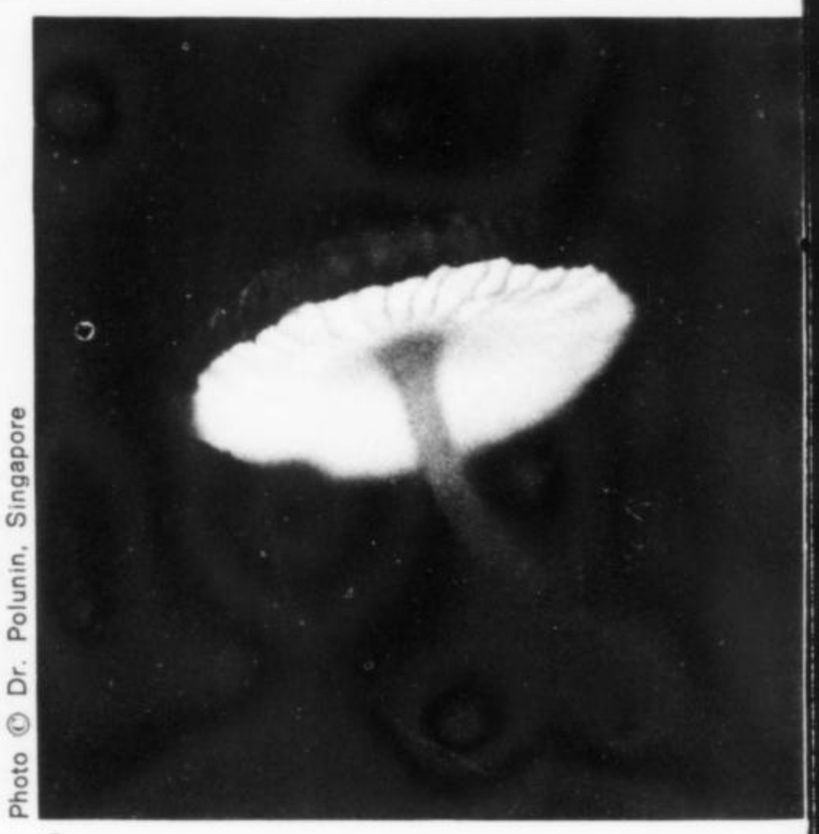
Besides the rapidly increasing use of tropical forests as a source of wood, forest land is increasingly needed for food production and industrial crops such as palm oil, cocoa and rubber as well as for mining and urban growth.

Plants that glow in the night

1. A formidable array of highly-coloured fungi sprouts from the floor of the tropical forest. Some even glow in the dark, like this Borneo fungus *(Mycena cyanophos)* which gives off enough light to be photographed in the dark without a flash.

2. Another Borneo fungus, known as a maiden's veil from its fine net-like form. During its mature life of less than a day it gives off a strong smell, attracting insects which feed on its sticky spore-laden cap. When the insects leave, the spores stick to them and are carried away to grow into new fungi.

3. This handsome Malaysia forest flower is one of the more than 20,000 species of orchids that grow throughout the world, mostly in tropical and sub-tropical lands. The number of wild orchids is being rapidly reduced by intensive collecting.



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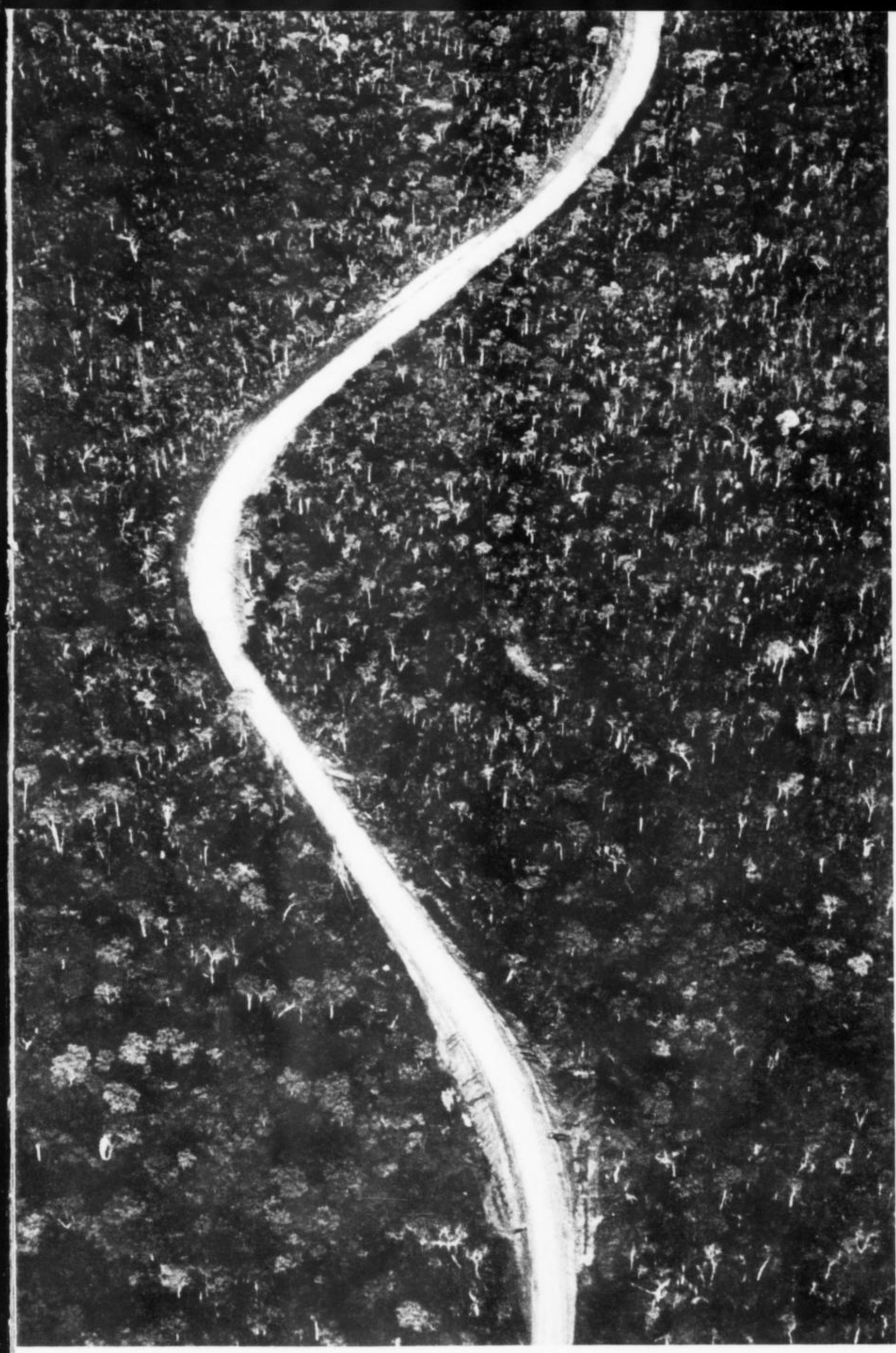

Photo Georg Gerster © Rapho, Paris

The construction of air strips and of road systems such as that now being completed in Amazonia means that large areas of forest which were previously almost inaccessible can now be easily reached by settlers and this inevitably leads to much unplanned and uncontrolled forest clearance.

Though the need for more food production is evident, it is unfortunate that much forest is still being cleared for the production of low-yielding crops and for non-permanent types of agriculture.

It is often supposed by those not familiar with the ecology of the tropical rain forests that they will quickly regenerate after being cleared, or that they can be easily replaced by plantations of useful tree species. Unfortunately this is not the case.

Land abandoned after cultivation soon becomes covered with a tangle of bushes and climbers which after a few years develops into secondary forest. But this forest consists mainly of short-lived soft-wooded trees of little economic value; only after a long process of succession does this second growth become more or less similar to the primary forest which originally occupied the site.

Such evidence as there is suggests that a long period, perhaps several hundred years, is required for this process. And if the natural succession is to take place, neighbouring areas of intact forest are required to provide the seeds and the associated fauna necessary for colonization.

When forest clearance is on a very large scale, as in modern lumber undertakings, it is often doubtful if enough forest is left to ensure recolonization, even if this is the intention. If deforested land is repeatedly disturbed, and especially when it is also subject to fires, it is often invaded by *Imperata* and other coarse grasses which convert the forest into a kind of savanna. This is of very little economic value and provides a less satisfactory protection to the soil than the former forest cover. Natural forests have been replaced by planted mono- ▶

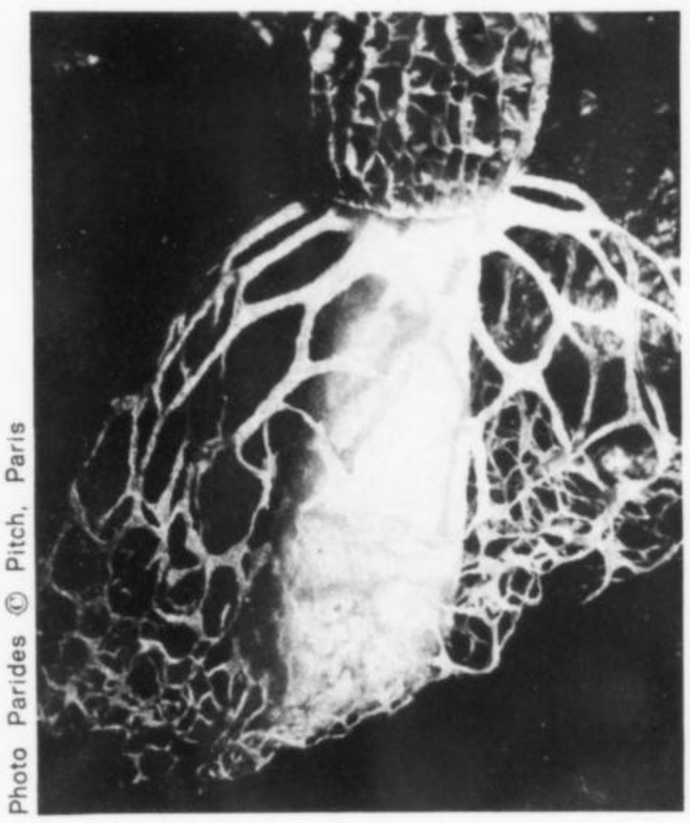

Photo Parides © Pitch, Paris

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Photo A. Raynon © Pitch, Paris

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Above left, a new highway rakes through the green mass of a South American forest, first step in a process that may replace luxuriant vegetation by logging and mining sites and pastures for cattle-raising.

cultures of trees or by mixtures of several planted species in many places but on a relatively small scale. The technical problems of establishing such artificial forests are considerable and cannot be said to have been completely overcome.

As a result of these relentless human pressures the tropical rain forest is everywhere in retreat. It might be expected that such a drastic change in one of the world's major natural features, and one fraught with such enormous potential consequences for human welfare, would have been carefully recorded and monitored, but so far this has not been done.

Though it would be relatively easy to estimate forest areas on air or satellite photographs taken at intervals of a few years, hardly any accurate comparisons of this kind exist.

In Sarawak (Malaysia), a country in which rain forest covered about 75 per cent of the land surface in 1950, a comparison of photographs taken in 1946-48 with those taken in 1958-60 showed a decrease of about 2 to 3 per cent in the area of primary lowland forest. The conclusion was that all of this forest will have disappeared in at most 20 years. Comparable figures for other parts of the tropics are badly needed and the recent decision by the Governing Council of the United Nations Environment Programme to give high priority to systematic monitoring of the area and the rate of decrease of the world's tropical forests is very welcome.

Forest clearance, which in many parts of the tropics had scarcely begun even 50 years ago, has enormously increased as a result of the population growth and technological advances of the last two decades and it is certainly still accelerating. It cannot be doubted that unless present trends are changed all the primary lowland tropical rain forest in the world will have disappeared well before the end of the century, except in remote and inaccessible sites and a few small biological reserves. Within hardly more than a generation the landscape of the Malay Peninsula, the Amazon basin and other humid tropical countries, will have been completely changed.

If the vast rain forest areas of the past were to be replaced by a smiling landscape of productive farmlands and plantations, there would be less cause for concern, but unfortunately it is probable that much of the former forest will be replaced by tracts of derelict scrub, secondary savannas and relatively unproductive second-growth forests.

Most people would agree that because of their ecological complexity and their unique wealth in wonderful and often very beautiful forms of plant and animal life, tropical rain forests are a precious part of our human heritage. The loss to human experience would be irreparable if they were allowed to disappear. Leaving aside arguments about the effects of tropical rain forests on climate and the atmosphere, there are very solid economic arguments why it would be short-sighted, to say the least of it, to allow a valuable natural resource to be exhausted in hardly more than the life time of a single generation.

A large part of what remains of the tropical rain forest ought to be conserved, some for controlled exploitation and some preserved intact as natural monuments or biological reserves.

Yet it must be recognized that there are formidable economic, political and practical difficulties in the way of such a conservation policy.

One of the most intractable practical difficulties is that of size. It has long been realized that unless a rain forest area is above a certain minimum size the ecosystem cannot maintain itself indefinitely. This is obvious in the case of the larger members of the forest fauna: mammals such as elephants and large predatory birds demand much space if they are to survive. The same is also true of many rain forest tree species which normally occur in very low densities, in some cases less than one per hectare.

It seems probable that reserves should be measured in thousands of square kilometres rather than hectares if they are to be permanently viable. Some existing reserves such as Barro Colorado island in Panama are actually losing species because their area is too small. To set aside and police forest areas of such large size is in itself a serious problem.

The political difficulties are no less formidable. Most humid tropical countries are poor and in urgent need of foreign exchange for many social purposes. Tropical countries, like others, must also make their contribution to the world's insatiable demand for more food and raw materials. But since the remaining rain forest areas have at best rather mediocre agricultural prospects it would still be possible to conserve considerable areas of forest with little loss to future world food supplies However, developing tropical countries cannot be asked to make sacrifices and shoulder burdens which wealthier countries are not willing to share.

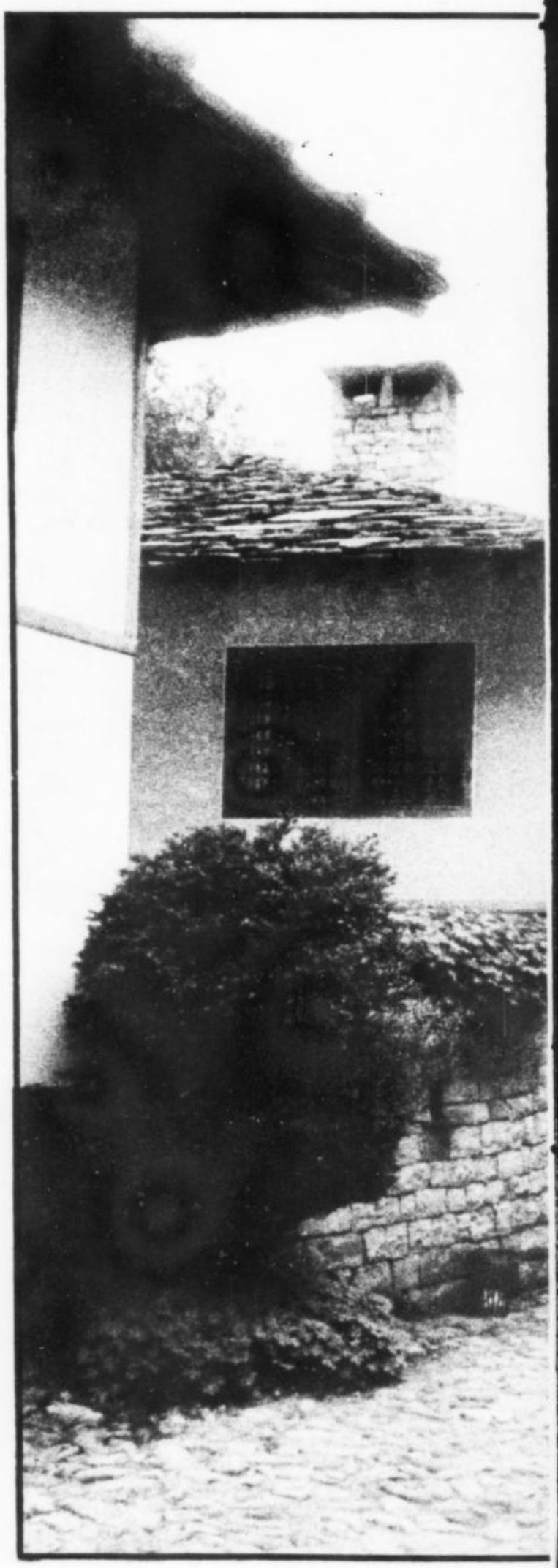
The problem of rain forest conservation thus becomes one of finding methods of international co-operation which are practical and politically acceptable to the countries where the forests are found. Here the United Nations' agencies have a part to play.

U.N. efforts to safeguard the rain forests. The U.N. agencies most closely involved in the exploitation and conservation of tropical rain forests are the Food and Agriculture Organization, Unesco and the U.N. Environment Programme. The World Health Organization is marginally involved

CONTINUED PAGE 32

Photo reportage produced for the* Unesco Courier *by Gérard Dufresne

Many old Bulgarian towns, villages and historic monuments have been protected and restored as part of a nation-wide programme to safeguard the country's cultural heritage. Below, a street in the museum-village of Etara (near the town of Gabrovo, famed as Bulgaria's capital of humour) where traditional crafts such as metalwork, pottery and leatherwork are again being practised in restored workshops. The village is now a popular attraction for tourists from Bulgaria and elsewhere.



BULGARIA GIVES A FUTURE TO ITS PAST

A score of ancient towns and villages find new life through a nationwide restoration programme

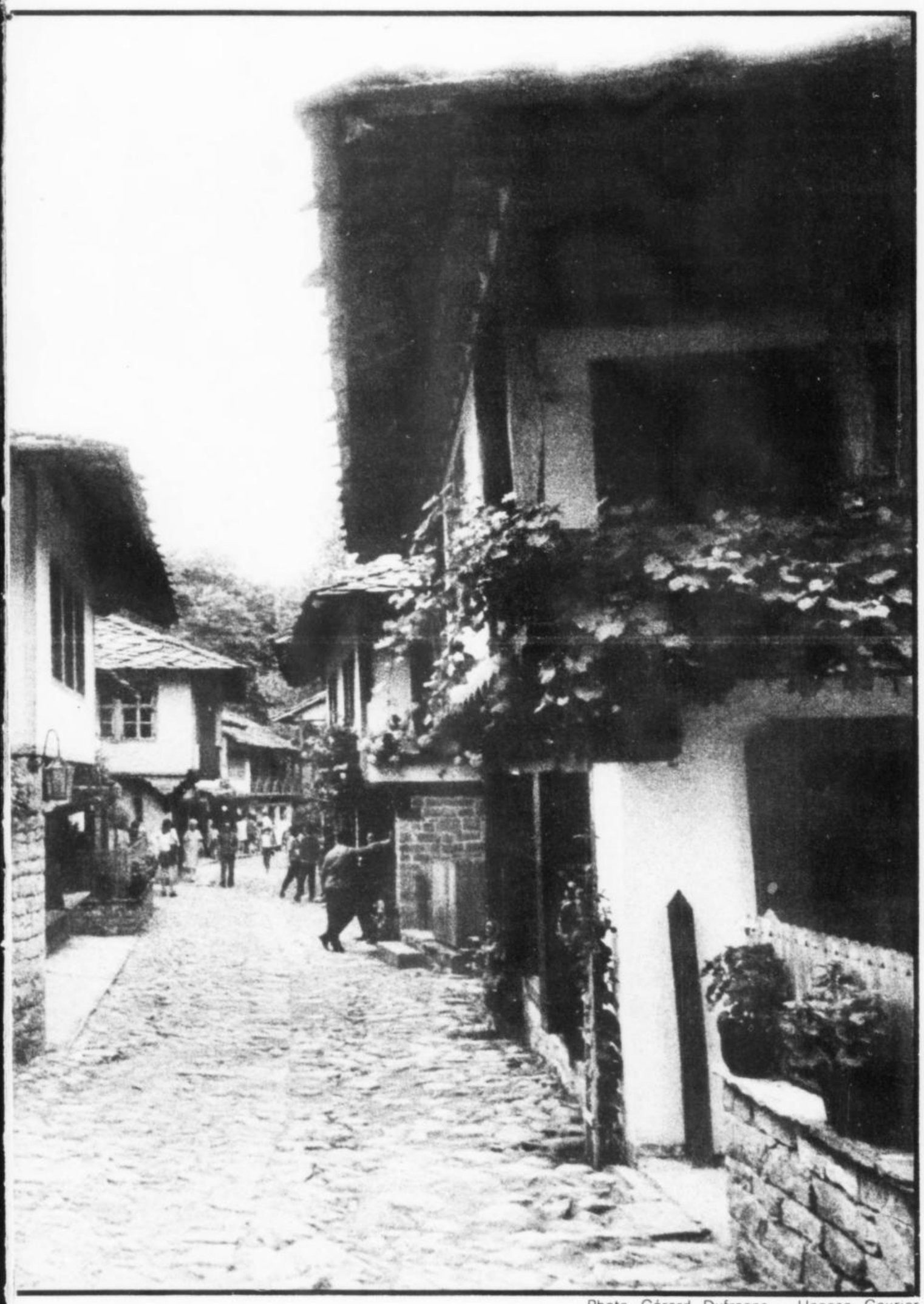


Photo Gérard Dufresne - Unesco Courier

by Magdalina Stancheva

OLD towns, old villages, old buildings disappear every day. They are swallowed up by encroaching concrete, levelled under the macadam of new highroads, or simply lost through incompetence and negligence. Yet in our modern world, with its insistent demands for roads, factories and housing, more and more people deplore this razing of the past and want to save whatever can still be rescued.

They are motivated not only by a respect for the past and a wish to perpetuate historical, architectural or æsthetic values, nor merely by a concern for the economics of the tourist industry. Above all they realize that old buildings in towns and countryside transmit to us today the irreplaceable legacy of generations who have gone before us.

Ancient buildings bring to us an echo of the spirit of the craftsmen who built them; we can see the skill of their hands, the living image—even if it is often broken and fading—of the age-old quest for harmony, stability, and happiness.

So, we must save what we can. And to the question, "Is there still time?", the answer must be "Yes!" Modern techniques are quick to destroy, but they can also restore life. Even better, they can find and unearth treasures that time has buried and of which our own forefathers knew nothing. ▶

MAGDALINA STANCHEVA *is one of the leading archaeologists and philologists of Bulgaria. Head of the Archaeological Department of the Historical Museum in Sofia for the past 20 years, she has carried out investigations at all the major archaeological sites in her country. She was awarded the Sofia Prize for her pioneering work on Serdica (the ancient name for Sofia).*

Some countries are favoured in this way, and Bulgaria is one of them. The country's history, its political and social development and natural conditions have combined to maintain and preserve ancient settlements and monuments, dating from the Neolithic period to the modern age.

After World War II the Bulgarian state was able to launch a nation-wide programme to safeguard its cultural heritage. Steps were taken to give historic buildings and old towns special legal protection. Precise regulations were laid down for the use of public buildings and private dwellings, as well as for the financing of conservation and restoration work, and of urban development.

Provision was made for close collaboration between organizations concerned with the preservation of historic monuments and those responsible for planning much-needed urban expansion and improvement.

A score of towns and villages in Bulgaria are now protected by the law on cultural monuments and museums. Small groups of historic buildings and some private dwellings in a large number of Bulgarian towns and villages also benefit from the protection of this law.

Studies on the preservation of these ancient buildings also try to find a solution to the fundamental problem of integrating them into present-day life. Are they to live at the feverish pace of modern life or should they remain peaceful oases, sheltered from the din and bustle of the 20th century? As this problem itself changes over the years, no hard and fast solutions are possible.

The old Bulgarian towns and villages which have survived to the present day are astonishingly varied but they have a common link: most were built in the 18th and 19th centuries, although some indeed have older buildings inside their walls—generally churches, fountains and public baths.

But basically they belong to the period of Bulgarian history known as the National Revival which lasted from the middle of the 18th century to 1878, the date when the Bulgarian people achieved their independence after five centuries of foreign domination.

This epoch of major economic and social change for Bulgaria also saw a great flowering of intellectual life and democratic development. Architecture, painting, handicrafts, all bore the imprint of a new national consciousness.

Most of the builders of this period were unknown artisans who generally worked in teams under a master craftsman. Their skills created hundreds of buildings impressive for their harmonious proportions and artistic embellishments.

Bulgaria is divided up by groups and chains of mountains into a number of regions with distinctive climatic conditions, natural resources and landscapes. Although all Balkan architecture of the period has some common features, building styles, like the landscapes, vary from region to region, thus giving rich diversity to the Bulgarian architectural heritage.

The houses were built to last two or three centuries, and to provide homes for several generations. Well-tried building techniques and good

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Photos Gérard Dufresne - Unesco Courier

quality materials, together with patient and careful craftsmanship have enabled these buildings, whose design is sometimes fragile and delicate, to survive to the present day in a relatively good state. Most preservation work began before the link between past and present was broken, before life had completely gone out of the buildings.

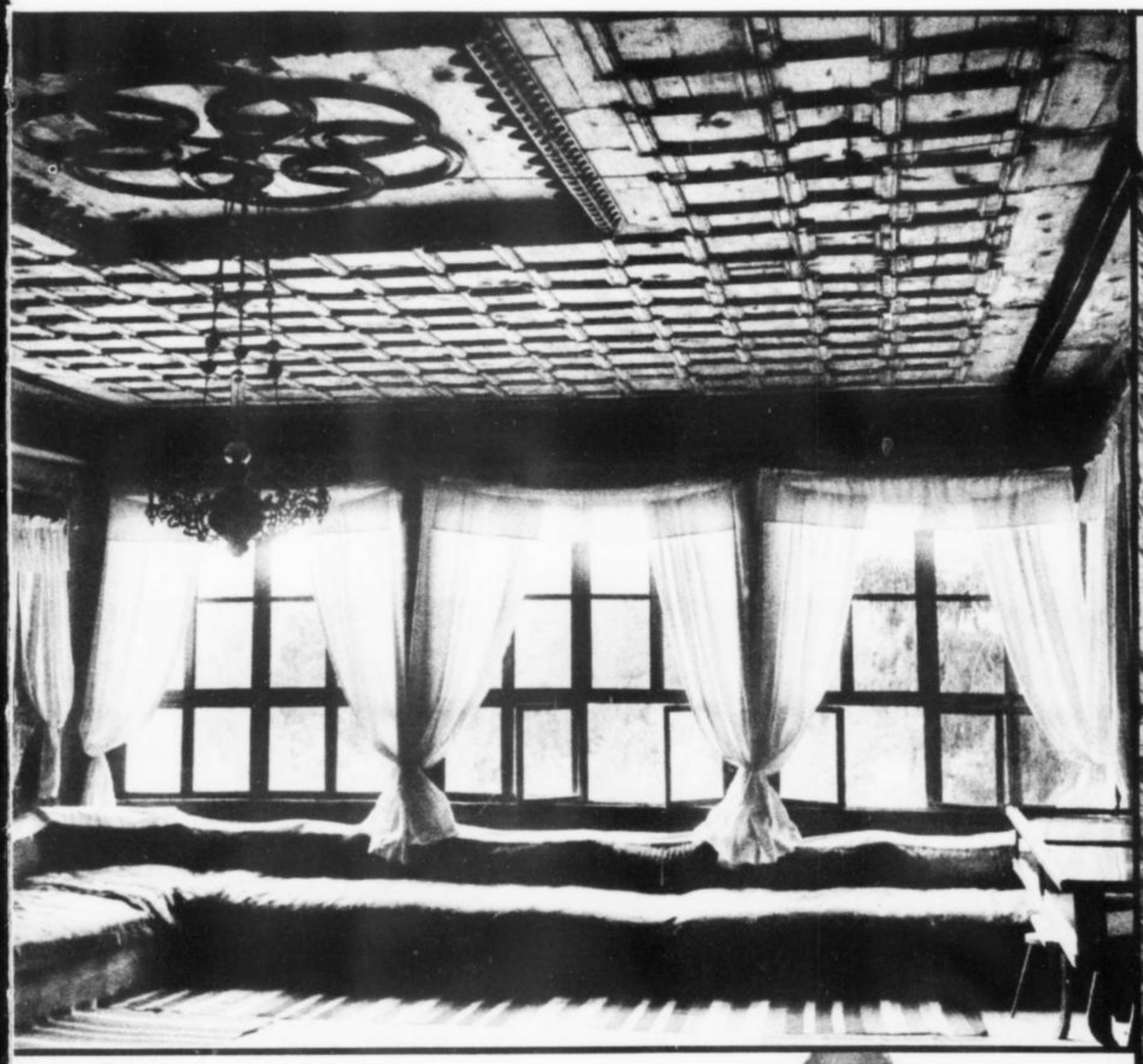
Conservation and protection have been financed by the State, usually through the People's Councils. The owners of private houses have retained the right to own and to continue to live in their old homes, on condition that they undertake not to alter the original appearance of the buildings in any way.

If an owner wants to sell his house, the People's Municipal Council buys it and decides on the best use for it. All preservation and restoration work is based on plans drawn up by the National Institute for Cultural Monuments. Directed by specialists from the Institute, the work is carried out by teams of highly-trained craftsmen.

During the last 15 years this work has expanded from emergency renovation of individual buildings to long-term planning of larger-scale operations. Sites for preservation are sought out and classified. Many of them are far from the main roads, isolated in mountain regions where as groups of buildings they have retained their original architectural forms intact.

Many different approaches to the preservation of Bulgaria's architectural heritage have been adopted, each tailored to the specific needs of a site.

For instance, within Plovdiv, a city bustling with economic and cultural activity, the old town still exists as a completely independent locality. It is perched on one of the three rocky heights forming the centre of Plovdiv. ▶



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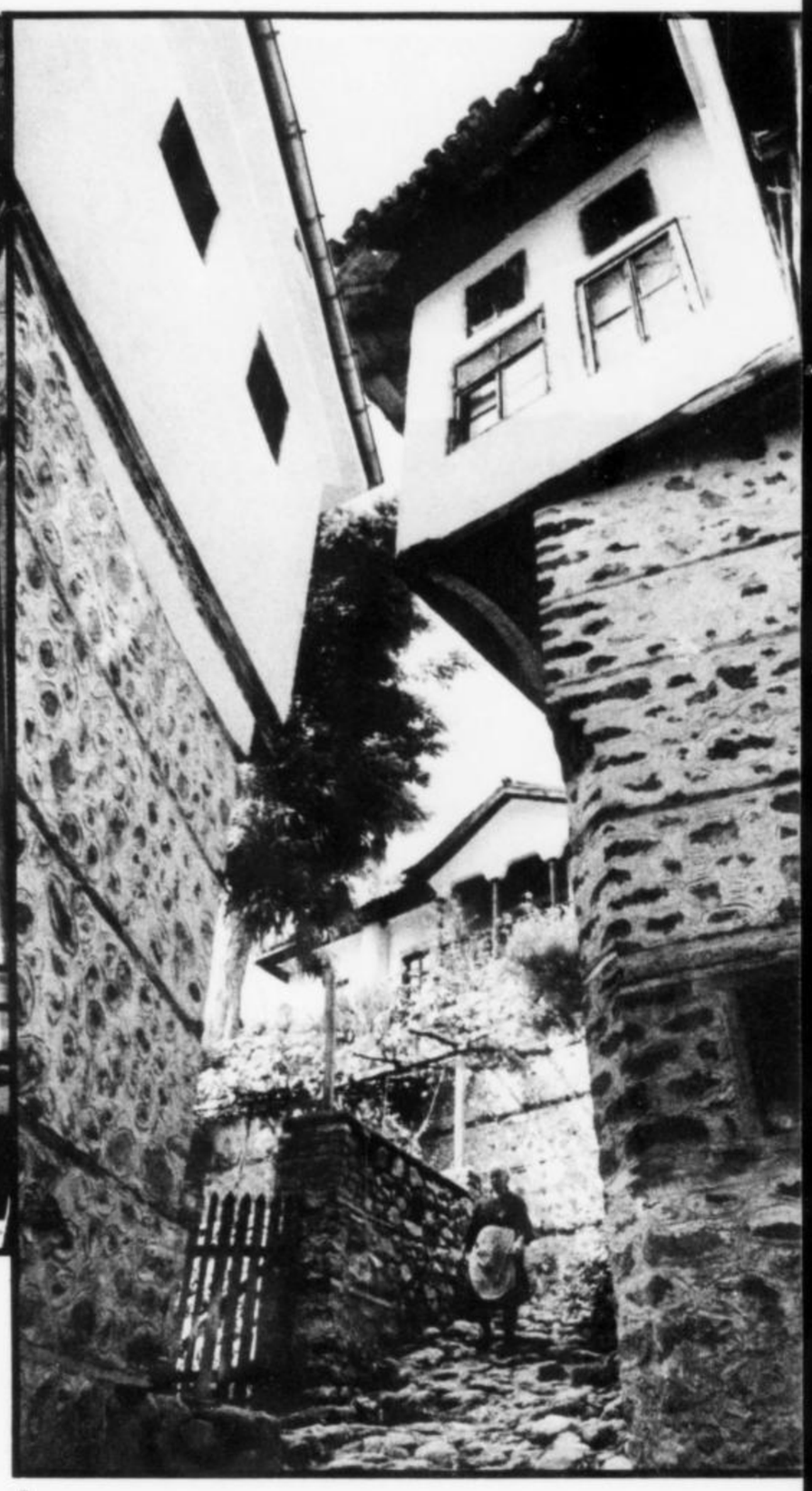

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Wooden struts buttress the overhanging upper storey of a newly-restored house in the ancient Bulgarian town of Plovdiv (1). Characteristic of Bulgarian village architecture, such wooden supports are a feature of this former wine-merchant's house in Melnik, southwest Bulgaria (4), where extensive restoration and excavation work has been carried out with the help of student volunteers (3). Skill of Bulgaria's woodworkers stands out in magnificent ceiling of this 19th-century craftsman's house, now a museum, in the town of Koprivchtitza (2).

Along the winding precipitous streets the houses stand on the edge of the rocks, seeming to make them jut out further. They are one or two storeys high on one street and as much as four or five on another.

Most of these houses are still inhabited. The biggest and the most characteristic in style have been turned into museums. Some have been converted into centres for artists and scientists ; others have been made into restaurants or cafés, without losing any of their charm. The narrow cobbled streets of old Plovdiv lead directly into the modern city.

The town of Melnik, situated in south-west Bulgaria on the slopes of the Pirin, one of the country's most beautiful mountains, presents quite different conservation problems. Surrounded by remarkable natural pyramids of sandstone, Melnik is located away from any main road. The vines that grow on the mountain slopes give the famous red Melnik wine, "so thick you could carry it in a handkerchief", as the locals say.

In former days the wine was transported to other European countries by camel caravans, which returned laden with merchandise of every kind. The townsfolk were extremely prosperous in the 18th and 19th centuries and built themselves new houses, summoning master craftsmen from far and wide and paying them in gold.

The masons built white houses with red roofs that contrasted sharply with the yellow background of the hills. The different storeys, the glassed-in balconies and the windows were carefully outlined in wood, like old etchings. Here the hand of man sought not to rival nature but to harmonize with it.

But at the beginning of this century phylloxera ravaged the vineyards, and today only a few of the famous vines

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remain. Between the first and second world wars economic depression forced so many people to leave Melnik that the population fell from 7,000-8,000 to its present 500.

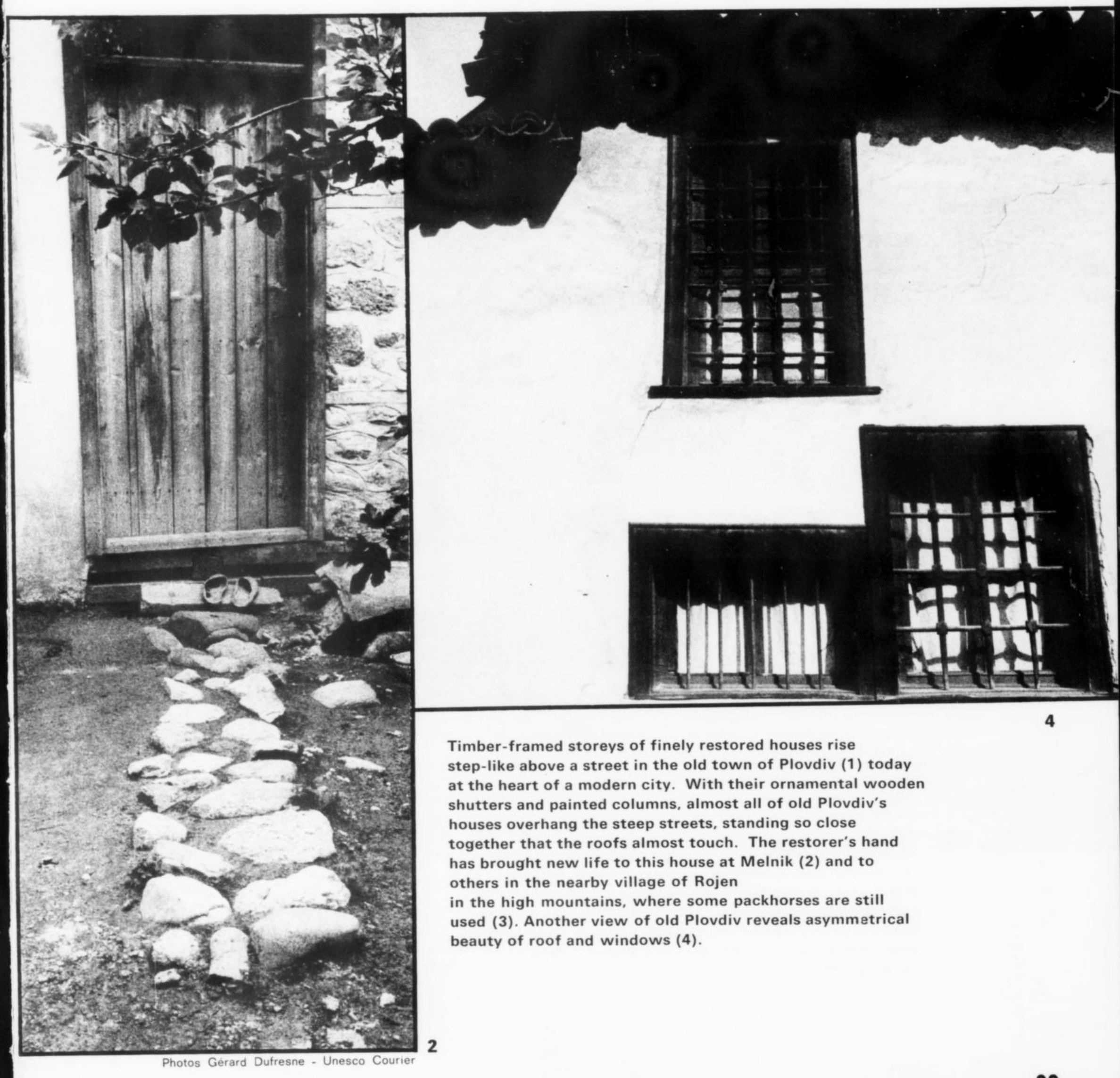
Since 1965 a team has worked all the year round to restore Melnik. Many houses that were falling into ruin have been strengthened. An urban development plan was drawn up limiting new building to a minimum, and providing for dilapidated houses to be rebuilt so as to restore Melnik's former architectural harmony.

Excavations have also begun on sites in Melnik, a town with a long history and an important centre of medieval Bulgaria from the 10th to the 14th centuries. Every summer now, student volunteers come to the sites to dig out the medieval castle, the town fortress and its churches—all buildings that will be partially restored. Melnik will continue to be above all a tourist town, for the mildness of its climate, the beauty of its surroundings and the proximity of bathing beaches guarantee that it will be busy for most of the year.

Villages sprang up in the surrounding areas in the 18th and 19th centuries, when Melnik was at its most prosperous. In recent decades young people have left these villages. Only old men and women, robust mountain people, still live there and maintain the traditional ways of life.

But things are changing since, one after the other, the villages have been accorded cultural protection. At Rojen for example, some villagers had decided to sell their houses, but they have abandoned the idea now that the State has agreed to restore the buildings.

On the other side of Bulgaria, the village of Bojentzi in the hills of Staraplanina (part of the Balkan chain) ▶



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Photos Gérard Dufresne - Unesco Courier

Timber-framed storeys of finely restored houses rise step-like above a street in the old town of Plovdiv (1) today at the heart of a modern city. With their ornamental wooden shutters and painted columns, almost all of old Plovdiv's houses overhang the steep streets, standing so close together that the roofs almost touch. The restorer's hand has brought new life to this house at Melnik (2) and to others in the nearby village of Rojen in the high mountains, where some packhorses are still used (3). Another view of old Plovdiv reveals asymmetrical beauty of roof and windows (4).

has been almost completely restored. At its most prosperous time in the last century, the village numbered 110 buildings—houses, workshops, a church and a school. Of these, 99 still remain and the rest will be restored with the help of old photographs and documents. And new inhabitants are now moving in to join the 70 or so persons, most of them old, who form the present population.

Some houses, abandoned by their owners, are being bought by artists' associations for whose members they provide ideal conditions for work and leisure. Others are being bought on their own account by painters and writers who want to settle in Bojentzi. Here, as in all towns designated as historic and cultural monuments, the sales have to be authorized by the People's Regional Councils.

At Bojentzi the roofs are covered with attractive old stone tiles in shades of grey-green. Against the white-washed walls the beams and the wood frames of the doors and windows stand out prominently.

The peaceful countryside, the charm of the narrow streets, the fine old trees in the courtyards and the gardens, all provide an ideal atmosphere for creative work. But artists and writers are not the only people who appreciate Bojentzi. Bulgarian and foreign tourists are also frequent visitors to the village, bringing an unaccustomed animation to its pastoral tranquility.

In many parts of Bulgaria today, conservation measures and a judicious policy of protection for the cultural heritage are restoring the spirit of the past and giving visitors an opportunity to enjoy peace and beauty while learning about Bulgaria's history.

One such place, Koprivchtitza, a historic town permeated with memories

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Past masters in the use of simple materials such as wood and tile, the anonymous builders of Bulgaria's 19th-century "national revival" left a heritage now being rigorously protected. Weathered grey sandstone tiles form an undulating "roofscape" in the mountain village of Bojentzi (4). Similar tiles crowning simple wooden gate (3) also at Bojentzi, contrast with the more classic formal tile pattern on this Plovdiv roof (2). Typical wooden shelter lines the courtyard of a craftsman's house in Koprivchtitza; pillars and frescoed arches lead to a majestic double staircase (1).

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of heroic struggles, is also a holiday resort. Here the lay-out of the streets sets off the richly decorated house fronts, the sculpted wood and the painted ornamentation in a striking harmony of colour.

Two old towns on the Black Sea, Nessebar and Sozopol, are especially popular as vacation resorts. In the modern holiday towns built nearby all the active working population of these two old towns finds employment from early spring to the end of autumn and even sometimes during winter.

Some historic villages in the Rhodopes mountains have become holiday resorts for the people who live in the towns of the plains below.

While Bulgarian towns have greatly expanded because of economic and industrial development over the last three decades, the link between town and village has not been broken. It has simply changed a little. Town-dwellers have never really lost contact with the old village world, and they want this world to continue. They wish to preserve old ways of life because they realize that these traditions still have living significance.

Of course the preservation of the towns and villages is not without its problems. But public opinion in Bulgaria is solidly behind the State in its policy to preserve the cultural heritage. The authorities can count on the collaboration of specialists and specialized institutions, as well as national organizations, including youth groups.

Through these efforts a new link is being forged between the past and the future in Bulgaria which, in its way, is a new Renaissance that echoes Bulgaria's national Renaissance in the 19th century.

■ ***Magdalina Stancheva***

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Photos Gérard Dufresne - Unesco Courier

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STRESS *(Continued from page 9)*

Throughout history, people have realized that the conflicts which have plagued human society have often proved disastrous for civilization. If we regard mankind as a single living organism rather than as a number of warring groups, the very idea that struggle between members of the same species can in some way be beneficial becomes absurd. How could one imagine a healthy human organism in which the individual cells or organs were guided by their own "private" interests and made war on each other?

A complacent attitude with regard to the disruption of human adaptation mechanisms would be nothing less than criminal. But where does the solution lie? History may provide the answer, for experience shows that when a society has been faced with a crucial problem, it has mobilized all its thinking power to solve it.

Until now the urgent need for a solution to this problem has not been fully appreciated. But once this need is felt, the ways and means can be found. It is more than likely that in our age of vast scientific knowledge and capabilities, mankind will succeed in understanding the nature of the adaptation mechanism and of how it is controlled.

The problem can only be solved by considering all the human aspects together, including the biological nature of man and the laws governing the functioning and inter-action of his various vital physiological systems.

It goes without saying that we shall meet with difficulties at every step of the way. But as Einstein said, everything we know about reality begins and ends with experience. And experience does not appear to contradict man's eternal optimism.

■ ***Ivan S. Khorol***

DOOMSDAY FOR THE TROPICAL RAIN FORESTS? *(Continued from page 24)*

because of its interest in diseases such as yellow fever and malaria which are often closely associated with forest conditions and the World Meteorological Organization has some involvement, because of the possible climatic effects of deforestation.

The Food and Agriculture Organization has long been active in tropical forestry, in collecting and disseminating information, promoting forest education, aiding forest administrators in tropical countries and in improving methods of growing, harvesting and utilizing tropical timbers and other forest products. FAO is also concerned with research on tropical tree breeding and gene resources, forest soils and other scientific aspects of tropical forestry.

FAO activities have thus far been mainly connected with the more efficient and economical use of tropical forests both as producers of timber and other commercially valuable products and with the role of forests in soil conservation and watershed protection. More recently however FAO has also become interested in the conservation of tropical forests and the wild life dependent on them. It has helped to train administrators and experts in tropical countries in national park and wild life management.

Investigations sponsored by FAO into the possible use of derelict land and second-growth vegetation for planting pines and other trees for making paper pulp could give much indirect help to tropical rain forest conservation by diverting some of the pressure from the remaining natural forests to land at present almost entirely unproductive.

Unesco's main role in the field of tropical forest ecology and conservation has of course been in education and research, in promoting contacts between specialists concerned with tropical forests and their survival. Because lack of knowledge was, and still is, a serious problem in this field, Unesco's role is an important one.

Since 1960 Unesco's main efforts have been concentrated first on the International Biological Programme and then on its successor, Man and the Biosphere. In earlier years however Unesco was responsible for some valuable initiatives, notably the very useful series of symposia on tropical ecology beginning with the Kandy symposium in 1956. These played an important part in bringing together the few and scattered experts in the field and in encouraging further research.

The International Biological Programme was concerned with worldwide natural resources and it stimulated a considerable amount of ecological research in tropical countries. One of its projects specifically aimed at the tropical rain forest was the ecological study of Pasoh forest in Negri Sembilan (Malaysia), one of the few remaining accessible areas of lowland rain forest in the Malay Peninsula. In this project British, Japanese and Malaysian research workers collaborated and the results presented at the symposium in Kuala Lumpur in August 1974 gave an impressive picture of how much the project had achieved.

The theme of the International Biological Programme was the functioning and productivity of ecosystems such as tundras, grasslands and forests under natural conditions. Man and the Biosphere is focussing attention on the effects of man on these same systems. The programme is organized into a number of projects, the first of which is the "Ecological effects of increasing human activities on tropical and subtropical forest ecosystems".

A panel of experts met in Paris in May 1972 to draw up plans for this project and to define its scope. A wide range of problems is in urgent need of investigation such as the effects of converting tropical forests into plantations and other forms of land use and this will involve studying insect and fungus populations which are or might become pests, soil changes, the loss of species diversity and many other subjects.

Such research necessarily involves comparisons between natural ecosystems and artificial ones derived from them, so it is essential that undisturbed samples of natural systems should be available for study and it is thus vitaliy important that tropical forest areas such as Malaysia's Pasoh forest, which was used in the International Biological Programme, should continue to be preserved.

The U.N. Environment Programme has been concerned with the future of tropical forests since its foundation, and in 1974 prepared a report for its Governing Council on the present environmental situation in tropical forests and woodlands as one of the sectors of the world environment of critical importance.

Studying this report at its meeting in Nairobi in April 1975, the Council passed a number of resolutions, one of which was to ask for a system of monitoring the remaining tropical forest areas and the rate at which they are diminishing.

Among other objectives supported by the Nairobi meeting were the encouragement of research on the relationship between tropical forest ecosystems and water, air and soil, on the minimum self-maintaining area for tropical forest reserves and on agricultural systems for tropical forest areas more suitable than those at present available. It also wished to develop guidelines for the management of tropical forest ecosystems and their "wisest use".

The United Nations' agencies can do much to safeguard the future of the tropical rain forest but they will need the support of enlightened public opinion and the full co-operation of the tropical countries themselves.

■ ***Paul W. Richards***

UNESCO NEWSROOM

BOOKSHELF

RECENT UNESCO BOOKS

■ **Artists and their Public,** by Nigel Abercrombie. 1975, 123 pp. (15 F).

■ **Cultural Policy in Kenya,** by Kivuto Ndeti. (Studies and Documents on Cultural Policies Series) 1975, 70 pp. (10 F).

■ **National Communication Systems: Some Policy Issues and Options,** by E. Lloyd Sommerlad. (Reports and Papers on Mass Communication, No. 74) 1975, 35 pp. (6 F).

■ **New Trends in Chemistry Teaching, Volume IV.** (Based on papers prepared for the International Congress on the Improvement of Chemical Education, Wroclaw, Poland, 1973). 1975, 159 pp. (20 F).

■ **Agriculture and the Development Process: Tentative Guidelines for Teaching,** by Louis Malassis (first of a series on education and rural development). 1975, 264 pp. (32 F).

■ **School Furniture Development: An Evaluation,** by F.B. Scriven and Associates. 1975, 54 pp. (8 F); **An Experience-centered Curriculum: Exercises in Perception, Communication and Action,** by David Wolsk. Study on a Unesco-sponsored project to develop a new approach to education for international understanding. 1975, 52 pp. (8 F) (Educational Studies and Documents, Nos. 16 and 17).

■ **French in Africa. A guide to the teaching of French as a foreign language,** by Jacques David. English adaptation by Penelope M. Sewell. (A Unesco source book on curricula and methods) Co-publication: Evans Brothers (London and Ibadan)/ Unesco. 1975, 230 pp. (28 F).

■ **An Experiment in the Ruralization of Education: IPAR and the Cameroonian Reform,** by Raymond Lallez. 1974, 113 pp. (12 F); **Educational Innovation in India,** by Dr. Chitra Naik. 1974, 50 pp. (6 F); **Experimental Period of the International Baccalaureate: objectives and results,** by Gérard Renaud. 1974, 69 pp. (8 F). (International Bureau of Education: Experiments and innovations in education, Nos. 8, 11 and 14).

OTHER BOOKS

■ **The Amazon,** by Tom Sterling and the Editors of Time-Life Books. Second impression, 1974, 183 pp.; **Borneo,** by John MacKinnon and the Editors of Time-Life Books. 1975, 184 pp. (Both published by Time-Life International (Nederland), B.V., Amsterdam in the series "The World's Wild Places").

■ **Sacred Dance: Encounter with the Gods,** by Marie-Gabriele Wosien. Thames and Hudson Ltd., London, 1974, 128 pp.

■ **Readings in Glass History, No. 5.** The glassmakers of Lorraine—who were they? Selected and edited by Anita Engle. Phoenix Publications, P.O. Box 8190 Jerusalem, 1975, 82 pp. ($ 4.15 plus 75 c. postage).

'Innovation' in education

A new bi-monthly newsletter, "Innovation", is now being published by the International Educational Reporting Service, the global reporting system on educational innovation set up in 1974 as part of Unesco's International Bureau of Education in Geneva (1) and primarily designed to serve developing countries. "Innovation" appears in English, French and Spanish editions and is being distributed through Unesco's Regional Offices for Education and other centres of the global reporting network.

(1) International Bureau of Education, Palais Wilson 1211 Geneva 14, Switzerland.

$50,000 from Qatar for Unesco's African fund

The State of Qatar has contributed $50,000 to Unesco's Special Fund to promote African Research and Development. The Fund, set up by Unesco's General Conference in 1974, is to be used to launch or strengthen research and development in Africa, including the training of specialists, particularly in Sahelian ecology, water resources and solar, wind, geothermal and other energy sources.

Learning from the neighbours

Teams of experts sent by the Fed. Rep. of Germany's National Commission for Unesco have been surveying operations for the protection and restoration of historic towns and localities in nine European countries in order to profit from their experience in this field. The survey was made in co-operation with the Unesco National Commissions of these countries (Austria, France, Hungary, Italy, the Netherlands, Poland, U.K., Switzerland and Czechoslovakia) and its results are being published this year.

U.N. promotes use of geothermal energy

Specialists in energy resources development from 50 countries met recently at a U.N. symposium in San Francisco, to study ways of using geothermal resources to meet the world's future energy needs. U.N. technical assistance has already helped to develop geothermal electric generating plants in El Salvador and northern Chile, and other U.N. aided geothermal exploration projects are under way in Kenya, Ethiopia and India.

'Film Women International'

The first world association of women working in cinema, "Film Women International", has just been founded by women directors, producers, actresses and critics. It was set up at an international seminar at St. Vincent (Italy) organized on the occasion of International Women's Year by Unesco and the autonomous regional government in the Valley of Aosta. "Film Women International" will promote films reflecting a truer image of women than that shown in most films today, compile a catalogue of films made by women and create an international centre for research and information about these films.

Japan's earthquake early warning system

Around 90 per cent of the earthquakes that hit Japan originate on the seabed. To provide a more effective earthquake warning system, the Japanese Meteorological Research Institute has set up four chains of off-shore seismic detectors linked to coastal relay stations and Tokyo's seismographic centre. The system will also give warning of tidal waves.

Flashes

■ *Occupational health risks claim the lives of some 100,000 workers each year and permanently disable 1 1/2 million more, reports ILO.*

■ *Barbados has the highest literacy rate (98 per cent) of all developing countries, according to the U.S. Agency for International Development.*

■ *Malaria has been eradicated in 37 countries, with a population totalling some 200 million, but in 1975 one million children will die from the disease in Africa alone, says WHO.*

■ *Average life expectancy in the developing countries is estimated at 55 years, as against 71 years in industrially developed ones, according to the World Population News Service.*

■ *Total world nuclear power capacity rose from 16,300 megawatts in 1970 to almost 82,000 megawatts this year and may exceed 220,000 megawatts, by 1980, reports the International Atomic Energy Agency.*

Namibia and the United Nations

Entitled "Namibia—United Nations Direct Responsibility", this is the latest commemorative stamp to be issued by the U.N. Postal Administration. It depicts a cupped hand and forearm superimposed over Africa with Namibia shown in relief. The U.N. Council for Namibia, the body entrusted by the U.N. General Assembly with the task of administering the Territory until independence, is conducting an international campaign to bring about the withdrawal of South Africa from Namibia.

Letters to the Editor

BARTHOLOME DE LAS CASAS

Sir,

No one doubts that Bartholomé de Las Casas was a champion of Indian rights in 16th century Spanish America (as your June 1975 issue describes him). He also incidentally left behind him what was tantamount to a massive denunciation of colonialism. Unfortunately, Las Casas never quite took the step of questioning the entire concept of European expansion.

In his own words, "I direct my efforts not... to shut the gates of justification and annul the sovereignty of the Kings of Castile; but I shut the gate upon false claims made on their behalf." —Las Casas (1550). Unfortunately any claim at all had to be bolstered up by slave labour, and so Las Casas, since he accepted the claim and wished to free the Indians, argued instead for the replacement of Indian slaves by African slaves. (Bartholomé de Las Casas to the Council of the Indies, Jan. 20, 1531).

To say that other people too had argued for it is beside the point. Las Casas in 1531 asked for "Negro" slaves in spite of the fact that already in 1511, Ferdinand I, King of Spain, had written to Hispaniola the following: "I do not understand why so many Negroes have died: take good care of them". While for Latin Americans then Las Casas remains the champion of rights, to some of us in the Caribbean, descendants of African slaves, he remains the symbol of the extent to which ecclesiastical sophistry went to protect colonisation, and the extent to which "Negroes" were excluded from any rights at all.

As it turned out Las Casas did not prevent the mass genocide of Indians in the Caribbean; he did not prevent the encomiendas or the confiscation of lands in the rest of Latin America —and he did add his prestigious voice to those who gave the infamous African slave trade an air of Christian morality.

W. Austin Simmonds, M. O'Callaghan,
Trinidad and Tobago
Keith E. Taylor
Jamaica

AMATEUR SCIENTISTS THE WORLD OVER

Sir,

All over the world there are amateur scientists, individuals and groups who are studying the world in which we live simply for the joy it gives them. Some belong to field groups who study insects, plants, birds or animals. Others explore the geological history of their own environment. There are amateur astronomers, like us, who find our fun in studying the sky.

It seems to me that you could do a very good issue using the work of individuals and groups who study nature for the love of it and often make valuable contributions to scientific knowledge in the process.

There is a young man in Japan who with a telescope on the roof of his house discovered a comet a few years ago. There is Patrick Moore in England with his regular TV programme called "The Sky at Night". There is a newly formed Federation of Astronomical Societies in the U.K., and hundreds of folk taking part in a regular count of the meteors both sporadic and in showers under the auspices of the British Meteor Society. There is a watch for fireballs being done using cameras with fish eye lens attachments, also organized by amateurs here, though the work is done in the Federal Republic of Germany and the U.S.A. by professionals. And I am only talking about astronomy. Just think of all the other sciences, geology, biology, ecology, radio, botany, entomology, etc.

Cyril D. Blount
Secretary, Norwich Astronomical Society
Norwich, U.K.

BOTANICAL ENIGMAS OF THE PAMIRS

Sir,

I read with interest the letters you received from readers regarding my article on botanical enigmas of the Pamirs (November 1974 issue). These responses (February 1975 letters page) show that the work being done by the Pamirs biologists and the importance of the research carried on in this remote country is widely appreciated.

I am especially grateful to these readers for their pertinent comments and remarks, such as the need for monitoring soil radiation and the intensity of cosmic rays, which is of course being done in the Pamirs Biological Institute, a very young research establishment set up only a few years ago. In my article I wrote only about what had already been achieved, for scientists prefer not to talk about experiments that have not thus far brought tangible results.

But I did mention the contacts that are maintained between the Pamirs biologists and physicists from the Moscow Institute of Atomic Energy, who have been investigating cosmic rays in the Pamirs. I believe that in the near future we shall hear more about the amazing work of the Pamirs' scientists.

Anatoly Pokrovsky
Moscow, U.S.S.R.

OUR POISONED SEAS

Sir,

I strongly disagree with Lidi Borovik, who thinks your readers would be interested to know exactly how pollution of the seas is bringing disease and death to fish ("Letters to the Editor", June 1975).

I think it would be more useful to draw attention to the ineffectiveness of big international conferences in preventing such pollution. In ten years time, the Mediterranean, the Baltic and the Adriatic will be dead seas, and I don't think that Lake Baikal or the Caspian Sea are in any better condition. Until a strong supra-national authority is set up to enforce anti-pollution measures, increasing areas of the world's oceans will continue to die. But we must not expect the politicians to hand over control to an authority of this kind; their main preoccupation, economic growth, does not favour non-polluting industries.

A. de Benédis de Rotrou
Aix-en-Provence, France

MOSCOW'S HOSPITAL FOR DAMAGED PAINTINGS

Sir,

I was fascinated by your article and photos about the fate of the paintings by the 17th-century Spanish artist Francisco de Zurbaran (September 1974 issue). Indeed, works of art have sometimes unusual destinies as they move along with time and travel from continent to continent.

Last summer I was lucky to see another Zurbaran, *St. Justa*. It was shown at the U.S.S.R. Academy of Arts in Moscow among other paintings exhibited to celebrate the 30th anniversary of the All-Russia Artistic and Scientific Restoration Centre, founded in 1944 and named after Academician Igor Grabar.

The exhibition displayed some 400 works restored in recent years and the painting of *St. Justa* by Zurbaran opened up the exhibition—her delicate and gentle features appeared on posters in Moscow's streets and on invitation cards.

The war was still raging when Soviet art restorers set about the job of saving war-damaged art treasures. Since then they have given new life to many thousands of works both from Soviet and other countries' museums. They also helped to restore sculpture damaged during the 1968 floods in Florence.

I believe the All-Russia Restoration Centre's interesting work, its assistance to museums in the U.S.S.R. and other countries, its research, etc. all deserve to be widely known.

G. Bakulova,
Student, Kalinin Arts School
Moscow, U.S.S.R.

WHEN THE IRISH BEGAN TO EAT SEAWEED

Sir,

The back cover of your May 1975 issue carried a photograph entitled "Seaweed in the Soup", depicting a Japanese girl enjoying a bowl of "Wakame".

Unlike the Japanese, who consider seaweed a great food delicacy, the Irish were driven to consuming such nourishment when there was little else left for them to eat during the terrible famine which swept Ireland during the last century and the great poverty which ensued.

This "delicacy" is still consumed on the South-West Atlantic coast of Ireland—although needless to say it is no longer the staple diet; most of the haul nowadays goes to the iodine factories.

The Irish, incidentally, were too poor to elaborate ways of growing seaweed like the Japanese. It was—and still is—gathered up on the rough Atlantic beaches by local people with their donkey carts.

J. P.
Paris, France

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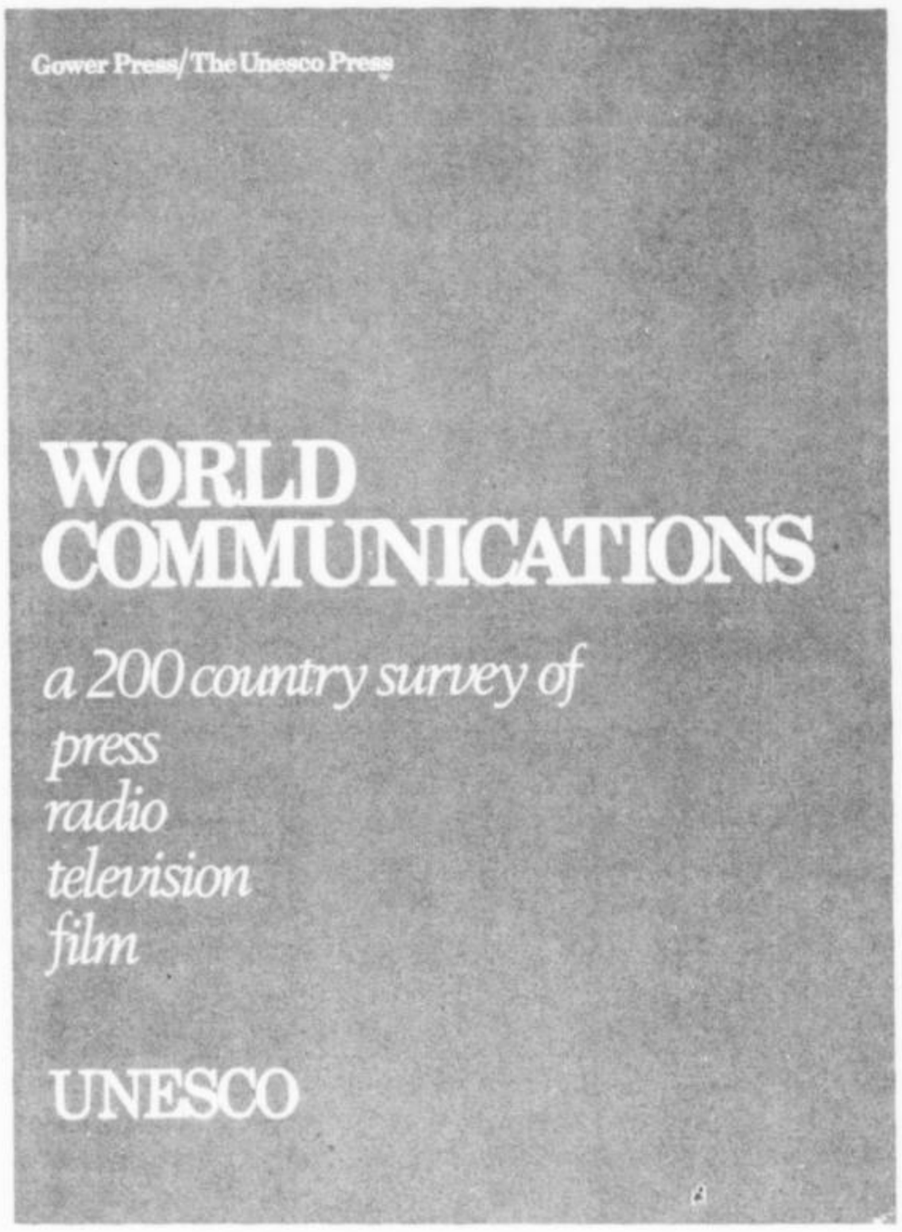

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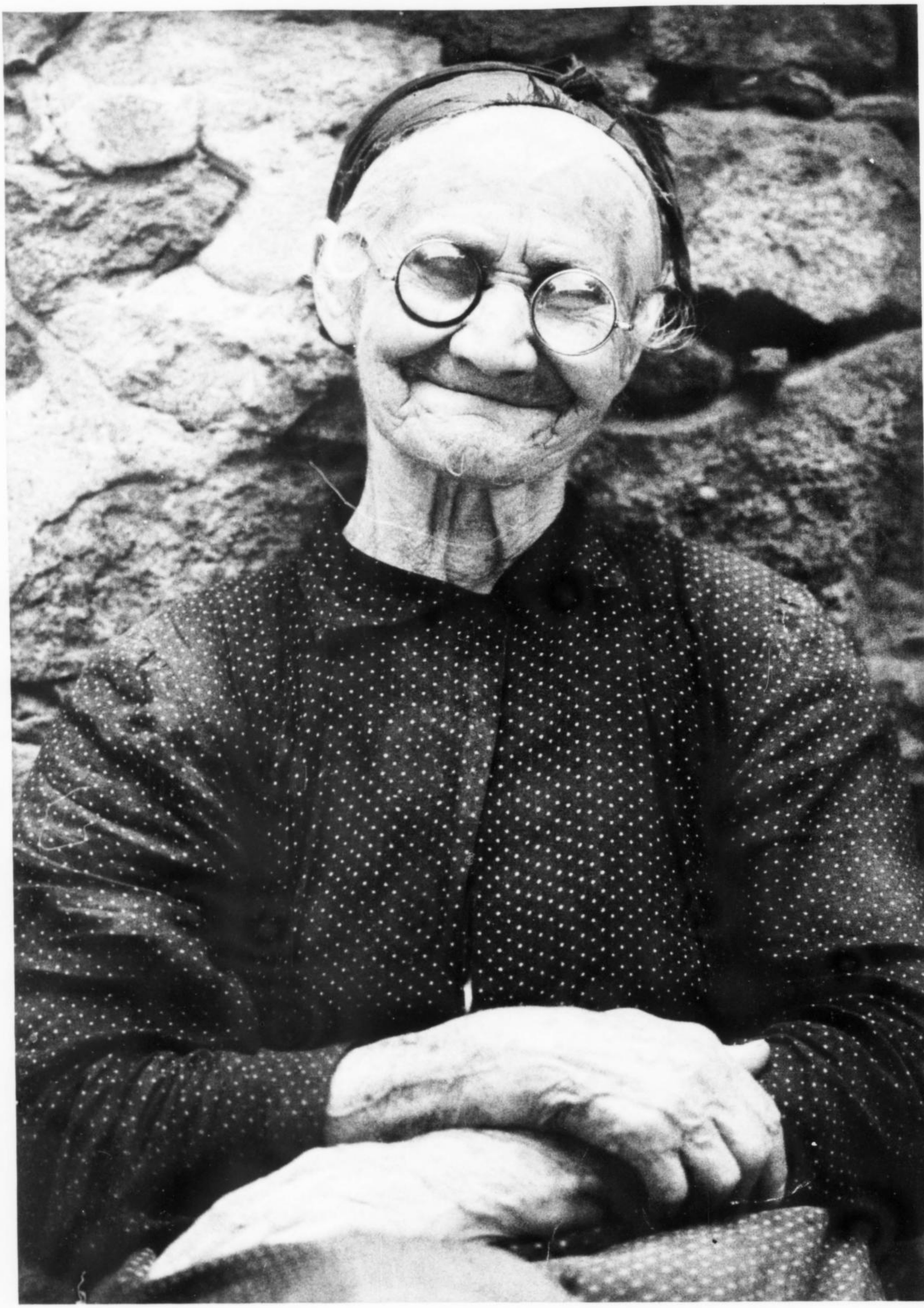

Photo Gérard Dufresne - Unesco Courier

THE BULGARIA OF YESTERDAY TODAY

In Bulgaria, a nationwide restoration campaign is bringing new life to many ancient towns and villages—treasures of architecture and craftsmanship—from which time-honoured ways of living seemed about to disappear. Woman shown here is from the old town of Plovdiv. (See article page 25)